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PEAKS, PASSES, AND GLACIERS.

A Series of

EXCURSIONS BY MEMBERS OF THE ALPINE CLUB.

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EDITED BY JOHN BALL, M.R.I.A. F.L.S.

PRESIDENT OF THE ALPINE CLUB.

"Per Nives sempiternas Rupesque tremendas."

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PREFACE.

In presenting this volume to the Public, it seems proper to offer some explanation of the circumstances that have led to its production. The European Alps have long exerted a powerful attraction upon strangers from other lands; our countrymen and countrywomen, in particular, have been accustomed to seek health and enjoyment in repeated visits to a region where, in matchless combination, the sublime scenery of snow-clad peak and glacier is associated with the softer beauty of lake and valley; but for a long time the crowds of tourists who annually visited the Alps were content to follow in certain beaten tracks, each one copying with almost servile fidelity the route followed by his predecessor. It is true that the two districts which once monopolised the attention of foreign visitors,

present a combination of attractions that are not surpassed elsewhere: Chamouni, and Cormayeur, Grindelwald, Lauterbrunnen, and the Grimsel, are spots that can never lose their charm for the lover of Nature; and since, in addition to these, tourists have found their way to new head-quarters, such as Zermatt, Saas, Gressonay, Macugnaga, the Æggisch-horn, Stachelberg, and Heiligenblut, it must be owned that no new routes which they can discover for themselves are likely to surpass those now known and accessible.

Of late years, however, an increasing desire has been felt to explore the unknown and little frequented districts of the Alps. The writings of Professor J. D. Forbes, those of M. Agassiz and his companions, and of M. Gottlieb Studer, led many in whom the passion for Alpine scenery was blended with a love of adventure, and some scientific interest in the results of mountain-travel, to strike out new paths for themselves, and especially in the higher snow region, which had before been almost completely shunned by ordinary travellers. Practice soon developed the powers of those who undertook such expeditions; experience showed that the dangers connected with them had been exaggerated, while at the same time it taught the precautions

which are really requisite. The result has been to train up amongst the foreign visitors to the Alps, but especially amongst our own countrymen, many men as familiar with the peculiar difficulties and risks of expeditions in the high Alps, and as competent to overcome them, as most of the native guides.

The powers thus acquired have been chiefly directed to accomplishing the ascent of the highest summits, or effecting passes across the less accessible portions of the Alpine chain; and within the last five years the highest peak of Monte Rosa, the Dom, the Great Combin, the Alleleinhorn, the Wetterhorn proper, and several other peaks never before scaled, have been successfully attacked by travellers, most of whose names will be found among the contributors to this volume.

In the accidental intercourse of those who have been engaged in such expeditions, it has been perceived that the community of taste and feeling amongst those who in the life of the high Alps have shared the same enjoyments, the same labours, and the same dangers, constitutes a bond of sympathy stronger than many of those by which men are drawn into association; and early in the year 1858, it was resolved to give scope for the extension of

this mutual feeling amongst all who have explored high mountain regions, by the formation of the Alpine Club. It was thought that many of those who have been engaged in similar undertakings, would willingly avail themselves of occasional opportunities for meeting together, for communicating information as to past excursions, and for planning new achievements; and a hope was entertained that such an association might indirectly advance the general progress of knowledge, by directing the attention of men, not professedly followers of science, to particular points in which their assistance may contribute to valuable results. The expectations of the founders of the Club have not been disappointed; it numbers at the present time nearly a hundred members, and it is hoped that the possession of a permanent place of meeting will materially further the objects which it has proposed to itself.

The interest shown by the Public in narratives of excursions through the less frequented districts of the Alps contained in several recent publications, had naturally suggested to others the idea of recording their adventures, either in separate volumes, or in the form of contributions to periodicals, when it was proposed that the facilities for combined action presented in the Alpine Club should be made

use of to bring together, in a single volume, some of the materials likely to interest the general reader, which were available in the hands of several members of the Club. It was thought to be no slight advantage, that in this mode of publication the effort of each author would be rather to condense than to extend his narrative, and it was hoped, at the same time, that the resources which could be made available for the present volume would secure a degree of excellence in the illustrations, — both plates and maps, — that could not easily be attained if several writers had separately given their productions to the Public.

Each chapter, containing an account of some separate excursion, or of a single district, is signed by the author, who is responsible for the accuracy of his own statements, and in this respect it is hoped that not much scope has been left for unfavourable criticism; but those who have had experience in the matter are aware that a traveller's notes are unavoidably incomplete, and that some occasional slip of memory in minute details must necessarily occur. In the snow region of the Alps, again, changes are perpetually occurring from one day, and even from one hour, to another; and it is only those who are unacquainted with the ice-world that

require to be told that they may find the condition of a glacier, or a snow-slope, very different from the description of preceding travellers.

It will be observed that a few of the contributions do not strictly relate to the chain of the Alps. It was not intended by the founders of the Alpine Club to limit the scope of their association by any geographical boundary, neither do those of the members who have taken a part in the preparation of this volume wish to adopt any such restriction; and if they should hereafter renew the present experiment upon the public favour, they hope to extend, still farther than they have now been able to do, the range of their inroads upon the higher regions of great mountains, wherever on the earth they may be placed. The paper upon the Ancient Glaciers of Switzerland and Wales will, it may be hoped, be accepted as coming fairly within the title of the present work, and as interesting from its intrinsic importance, as well as from the scientific eminence of the writer.

Although the plates and wood-cuts introduced into this volume have for the most part been taken from rough sketches made in the course of a long day's walk, they may be relied upon as generally correct; but as they represent objects quite out of the range

curate than the Catalogues contained in preceding English works.

The degree of success that may attend the present volume, and the extent and value of the new materials that may be accumulated in the course of fresh expeditions, will probably decide whether a new collection of Alpine adventures shall at some future time be presented to the Public.

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PEAKS, PASSES, AND GLACIERS.

CHAPTER I.

THE PASSAGE OF THE FENÊTRE DE SALENA, FROM THE COL DE BALME TO THE VAL FERRET, BY THE GLACIER DU TOUR, THE GLACIER DE TRIENT, AND THE GLACIER DE SALENA.

THE Glacier du Tour is perhaps the least generally and the least accurately known of the great ice-streams which descend on the northern side of the chain of Mont Blanc. It lies in so deep a recess, that its existence is scarcely suspected until the traveller is brought opposite to the opening by which it flows into the valley of Chamouni. The paths of the Tête Noire and the Col de Balme from which alone it is visible to the ordinary tourist are so near to the glacier, and the last slope over which it descends is so long and so steep, that even a careful observer could form no idea from below of the vast extent of its upper portion. It may be owing to this circumstance that it has tempted the curiosity of very few explorers. The passage I am about to describe was discovered many years ago by a man of the name of Munier; but, if I am correctly informed,

it was never attempted again till the year 1850, when it was made by Professor Forbes, as related by him in a very interesting chapter appended to his "Norway and its Glaciers." From that time till the year 1857, the date of the expedition recorded in the following pages, I could not learn that the passage had been taken by any one. It has since become better appreciated; and in 1858, two or three parties ascended the Glacier du Tour, and descended to Orsières either by the Glacier de Salena or by the Glacier d'Orny.

The Glacier du Tour is the most eastern of the glaciers of Mont Blanc descending into the valley of Chamouni. The great system of crags which closes up the head of the glacier may be roughly compared to the nave of a wheel, from which the four glaciers of Le Tour, Trient, Orny, and Salena are the radiating spokes: with this qualification, however, that the glaciers of Trient and Orny, which lie to the east of the Glacier du Tour on the one side, and of the Glacier de Salena on the other side, of the main chain, have a common origin in a vast snow-field from which the first descends rather to the east of north, and the second nearly due east. The Glacier du Tour keeps a general direction towards the north-west, while that of Salena, which is more sinuous, is turned a little to the south of east. It follows from this arrangement, that, while the lower extremities of the four glaciers are widely separated, they approach very near together in the upper region where they originate. It is not, however, so simple a matter as might be supposed to pass from the Glacier du Tour to that of Salena. The Glacier du Tour, the twin system of the Trient and Orny and the Glacier de Salena, are all on different levels; the Glacier

du Tour being much the highest of the three; the head of the Trient occupying an intermediate level, and the Glacier de Salena being much lower than either. There is a difference of probably not less than 1000 or 1500 feet between the level of the highest plateau of the Glacier du Tour and that of the portion of the Glacier de Salena which lies immediately behind the rocky boundary separating the two; and the precipitous nature of the southern face of the dividing range (above the Glacier de Salena) forbids all thought of passing directly across it. The only known passage is by the head of the Glacier de Trient, which must be reached by descending from the high level of the Glacier du Tour. At the very furthest recess of the Glacier de Trient, where it runs up into a little corner and insinuates itself between the two glaciers of Le our and Salena,—elsewhere separated only by an inaccessible wall of crag, the common boundary of both,—a narrow opening, which I have ventured to call the Fenêtre de Salena, gives a romantic access to the still lower level of the Glacier de Salena. A shorter descent to Orsières may be effected by leaving the Glacier de Salena altogether out of the question, and turning eastward as soon as the Glacier de Trient is reached. From half an hour's to an hour's walk over swelling snow fields then brings you to the head of the Glacier d'Orny, and Orsières lies almost beneath your feet. But to my mind, though the expedition is longer and more laborious, the attractions of the Salena route are far greater. At the time I first visited the Glacier du Tour, in 1857, it was supposed to be necessary to ascend quite to its highest portion, and to gain the Glacier de Trient by the very difficult descent I have here described; but, in 1858, an old friend and my-

self discovered a far easier passage through a gap in the chain of the Aiguilles Dorées, between the Aiguille du Tour and the head of the glacier, by which all danger or difficulty is avoided, and a very beautiful view of the Swiss Alps is gained. I should not conclude this rough topographical notice without saying that it appeared to myself and my companions of 1857 to be just within the limits of possibility that another passage may be found to the Glacier of Salena from that of Le Tour; but it can hardly be an easy one. As we all thought, from the very imperfect and hasty survey we had when descending the Glacier of Salena, the latter glacier runs up in a kind of deep inlet at the back of the Aiguille d'Argentières; and as we had observed that the rocks might be scaled without any great difficulty at the south-west angle of the Glacier du Tour, which adjoins the south-eastern buttress of the Aiguille d'Argentières, it occurred to us that it might be possible to effect a descent by the other side to that recess of the Glacier of Salena of which I have spoken. This, however, so far as we are concerned, is only conjecture; but the attempt is worth making, as the relative positions of the several glaciers and ridges of this portion of the Mont Blanc chain are but imperfectly known, and most incorrectly laid down on all the maps hitherto published.*

After waiting at Chamouni two or three days, hoping for weather fine enough to enable us to ascend Mont Blanc, finding that the barometer continued obstinately below "temps variable," and getting tired of expectation and inactivity, we resolved to attempt a somewhat less lofty expedition, and after discussing various plans, determined to see how the weather would serve us for the passage of the Glacier du Tour. Fortunately for us, Auguste

* See Note at the end of this Chapter.

Balmat, who was again my guide, was one of the few persons who had made the passage, having crossed the Col seven years before, in company with Professor Forbes; and the pleasure with which he looked back on that expedition, and the praises I had always heard him bestow upon the great beauty and grandeur of the scenery, had long excited my curiosity, and given me a strong desire to explore this wild and unfrequented region. Accordingly, on Monday morning, the 24th of August, 1857, we set off for the Col de Balme, intending to sleep there that night, and start for the glacier at two or three o'clock in the morning. The weather was anything but inviting; the wind blew a hurricane; the Monts Maudits and the whole of the Grand Plateau were covered with a dense mist of powdery snow. The Glacier de Taconnay, almost as high as the Grand Mulets, was dusted over with the dirt blown from the rocks. The Glacier des Bossons was dirtier than I ever saw it before, and when I walked up after breakfast to Balmat's cottage, a few hundred yards above the church at Chamouni, it was at times with difficulty that I kept my legs. With all this, the air was so close and sultry, that walking, even at a very moderate pace, was an unpleasant exertion. However, we had so often had occasion to observe that fortune smiles upon the brave, that we set off, five in number— R., W., and myself, Auguste Balmat and François Cachat — nothing daunted by these unpromising appearances, and arrived in due time at Argentières. The aspect of the weather grew worse every hour, and the good folk of Argentières prophesied our speedy return. Before we arrived at the Col de Balme, heavy rain had set in all along the valley of Chamouni, and soon after we reached the little hostelry, an impenetrable mist came rolling up

from the valley of Trient, shrouding in its cold grey folds every part of the prospect; the barometer fell still lower, and everything looked as badly for the morrow as it could do. We managed, nevertheless, to pass a very pleasant afternoon, and went early to bed that we might be ready for the weather as soon as it was ready for us. The wind was still so strong that I was obliged to have the outside shutter fastened to keep the rain out, so that I could see nothing; but, throughout the night, whenever I awoke, the soft and constant dripping of the water from the eaves told me that there was no change for the better. I had slept two nights at the Col de Balme, some ten days before, intending to make the same passage, but had been driven back to Chamouni by finding, when I woke on the 16th of August, eight inches of snow on the ground, and I began to think the present expedition was doomed to a like unsuccessful termination.

We rose at six with little hope, but just as we were finishing breakfast, one of those strange transitions took place which are not uncommon in mountain countries; and in a few moments the dreary cloak of mist was gone, no one knew how or where, and the eye ranged freely over the great aiguilles and glaciers of Mont Blanc, and over the green pastures of the valley of Chamouni, from the Col de Balme to the Col de Vosa. The change was as transient as it was rapid; a few seconds more, and all was wrapped again in the wreathing mist; but our hopes had been raised, and encouraged by the momentary glimpse of better things, we soon procured the necessary supplies and prepared for a start. It was just eight o'clock when we bid adieu to the landlord, and left our homely, but clean and hospitable, quarters for the

trackless waste of ice and snow which lay between us and the next human habitation we should see. In a few seconds we lost sight of the house, and were picking our way through the fog, towards the base of the heights which rise to the south of the Col de Balme and form the termination of the eastern boundary of the Glacier du Tour. Things began to look badly again, when suddenly the mist was rent into shreds before us, and almost over our heads we beheld the sharp summit of the Aiguille Verte, covered with the fresh snow of yesterday, and glittering with a thousand diamond points in the unclouded sunlight of that upper world. We joyfully accepted the vision as the earnest of a glorious day, and turned with quickened steps and more cheerful anticipations to face the short but rapid ascent that brought us, through alternate gleams of sunshine and shades of mist, to the edge of the precipices guarding the Glacier du Tour. Here we looked down upon a broken cataract of ice a thousand feet below us, streaming over the steep ridge that forms a sharp line of separation between the upper region of the glacier and the stupendous masses upon which the traveller gazes as he skirts the hamlet of Le Tour, on his way from Chamouni to the Col de Balme. We lingered here a few moments, and while doing so the mists cleared swiftly away and disclosed to our wondering eyes a vast series of plateaus, swelling domes, and steep banks of ice, stretching back from the point above which we stood to the origin of the glacier, a distance of many miles. A glance showed us that no easy task lay before us; for although the general direction was not difficult to be distinguished by the practised eye, at each considerable change of inclination in the surface of the glacier a formidable system of deep and yawning

crevasses seemed to deny access to the more practicable regions beyond. In the middle of the glacier the crevasses were of unusual size and difficulty, and extended in a nearly unbroken series high up into the loftier regions of the *névé*. On the opposite side of the glacier, a long wall of serrated rocks, in which numberless aiguilles shoot from amidst the buttresses of ice, and rise in rugged majesty to the sky, forms a stupendous and perhaps impassable barrier between the Glacier du Tour and that of Argentières. We saw it clad on every ledge and slope in its mantle of fresh-fallen snow, and glittering with a lustre almost insupportable to the unprotected eye, which warned us that the sun was already high, and that we had no time to dally if we would sleep beneath a roof that night. We therefore descended as rapidly as the necessity for some caution would permit, and in a few minutes reached the level of the glacier. We kept along the edge, clambering over the rocks as far as it was prudent to do so; but it was not above half an hour before we were obliged to quit them and take to the ice.

The brilliancy of the atmosphere, and the lustre of the new snow, made it advisable to have recourse at once to our spectacles and veils, and those of us who had them took advantage of the halt to put on their gaiters. We began by climbing a steep bank of frozen snow, dirty at the bottom, but bright and pure as we advanced, and thus marking the limit to which yesterday's fall had descended. Arrived at the top of this incline, we saw that the only practicable path must be over a vast dome of snow-clad ice, at no great distance from us, and lying immediately at the base of the Aiguille du Tour, which rose in imposing masses on our left. The base of this dome was guarded by an intri-

cate network of formidable crevasses; but, these once past, the unbroken surface beyond seemed for some distance to promise an easy advance. There appeared to be a double system of crevasses beneath the dome, the smaller immediately in front of us, the larger more to our right, and forming part of the great central system of crevasses which, throughout the lower part of the glacier, made progress in that direction impossible. As is very often the case, where these two systems approached one another the crevasses were somewhat broken, and it seemed likely that bridges would be formed by the falling in of their walls. Accordingly, we descended into a kind of little valley, making our way somewhat to the right, and further into the glacier, in order to profit by the junction of these converging ice-streams. Here, though not without some little difficulty, we effected a passage among the huge abysses on either hand, whose dark blue depths contrasted well with the spotless white of the fresh snow of the upper world. We now began a gentle ascent, winding round the base of the dome, but had not advanced far before we began to find ourselves seriously embarrassed by the multitude of dangerous crevasses which lay like pitfalls in our path, completely hidden by the new snow, now many inches deep. We found that we were amongst a system of crevasses lying longitudinally in the direction of our route, whose existence the gentle inclination of the glacier would scarcely have led us to suspect. We therefore turned to the left, and climbed some distance towards the top of the dome, crossing many a crevasse over which it was prudent to pass, not so much on our hands and knees as crawling "au ventre," with the alpenstock laid lengthwise in the snow still more to distribute the weight.

Higher up, we advanced for some distance without any great difficulty, till we were again brought to a stand by a most formidable set of crevasses, which threatened at one moment to forbid our further progress. They lay on the further side of the dome, just as we wanted to descend slightly into a magnificent hollow at the foot of a steep and lofty curtain of snow, by which we were to ascend to the highest plateau of the glacier. We had several times been obliged to take to the lying-down process, but at length we came to a crevasse of such width, as ascertained by sounding with the alpenstock, that we dared not attempt it, even on our faces. When we followed it up in one direction, feeling our steps with our sticks, along its edge, we found it still impassable, and fresh crevasses opening on the other side of us, so that we were upon a mere tongue of ice, with a hidden gulf on either hand. When we sought a passage in the opposite direction, we found the crevasse growing wider. When we turned to the right, to descend the side of the dome, and seek a passage lower down, we found ourselves stopped by a new crevasse, so wide that even through the thick covering a certain slight sinking of the surface, exposing a few inches of a broken crust of frozen snow, showed what we might expect in that direction. We were forced to turn back, and retrace our steps for a considerable distance, before we could find an exit from this perplexing labyrinth. At length we succeeded in quitting the dome and entering upon the basin beyond it, where we found the ice tolerably compact and safe. We were now well past the Aiguille du Tour, and saw that on our left a broad and deep gap in the chain of aiguilles seemed to offer an easy passage to the Glacier de Trient. I have since ascertained

that this opening affords far readier access to the head of the Glacier de Trient than the route we actually took.

Balmat and Cachat were both well laden and had had a good deal of work while we were extricating ourselves from the crevasses, so I insisted, at this point, on taking the lead of our procession. As soon as this change could be effected, we struck across the glacier, directly towards the Aiguille d'Argentières, which towered high above the steep bank of ice we had to ascend. To our surprise, no *bergschrund* appeared to run along the base of this *arête*, and the top was reached without any difficulty. We were all very much impressed with the grandeur of the upper end of the Glacier du Tour. Of all the countless aiguilles, named and nameless, which rise in rugged majesty throughout the whole range of Mont Blanc, and constitute so curious and characteristic a feature of the Mont Blanc scenery, few are to be compared with the Aiguille d'Argentières. It is not only of great elevation, towering far above any neighbouring summit, but is remarkable for the ruggedness of its sides, and for the number and varied aspect of the glaciers which literally stream down its base, while above, it is broken into fantastic and inaccessible precipices, or clothed with a glittering mantle of snow. These upper slopes are ploughed by the frequent fall of avalanches, and crowned by the sharp peaks in which the aiguille terminates, whose sides are spotted with irregular patches of white, almost to the very summit. Beneath its base, the glacier rises and falls in scores of great ice-domes, like swelling waves, separated the one from the other by crevasses of enormous size. Their dark shadows break up the glistening surface, which shines like a sea of diamonds in the noonday sun. To the left of the aiguille, just at the south-west corner of the

glacier, and beyond this maze of ice-works, is a gap in the serrated ridge, so like a col that one is tempted to make for it. That col is unexplored. We fancy it must lead either over to the Glacier d'Argentières, or perhaps more probably to a wild recess of the Glacier de Salena, whose opening we noticed from the other side of the pass, but of which the further end was hidden from our sight.

To the left of this col was a long and lofty ridge of mingled rock and snow, the southern boundary of the Glacier du Tour; it is depressed at its eastern extremity to what looked like another very passable col, for which almost any one unacquainted with the pass would have made. Later in the day, however, we saw what tremendous precipices of naked rock we should have found beneath us, had we gained the crest of this ridge. Immediately to the left of this depression, and occupying the south-east angle of the glacier, was a fine massive aiguille, towards the base of which we now turned, and pursued our still ascending way. The snow was deep and softened by the mid-day sun, and at every step we sunk above our knees. The labour of making the steps, under such circumstances, it is impossible to conceive without having tried it; and I was not at all sorry, after half an hour's experience, to give up the post of honour to some one else. Much caution was still necessary, for we were not yet out of the region of hidden crevasses. It was two o'clock before we reached the base of the nameless aiguille I have mentioned, when we descended into a deep chasm between the glacier and the aiguille, in order to avail ourselves of the boulders and rocks which lay along its side. In the bottom of this wild valley we toiled our way, still rising at every step, till about twenty minutes after two we reached

its highest point, and suddenly found ourselves gazing down upon the vast expanse of the upper part of the Glacier de Trient, apparently unbroken by a single crevasse; one swelling sheet of spotless white, marked only by the long track of a chamois, leading straight up to a narrow aperture in a huge wall of rock, through which we were to pass.

The Glacier de Trient was many hundreds of feet below us; and the problem was, how to reach it. We stood at the edge of a slope of nearly bare ice, too steep to slide down, and clothed with too little snow for that to help us. This ridge extended right and left, in an amphitheatre, whose diameter, measured from the gap where the chamois had crossed the chain to its extremity in the other direction, was about half a mile. Magnificent as was the weather, and clear as was the sky on the side of the Glacier du Tour, the mists hung so thick upon the Glacier de Trient that we could hardly tell how to approach it. When Balmat had made the passage before, they had been able to execute a glissade, and had thus descended in a few moments to the glacier beneath. The state of the snow now forbade any such pleasant and easy progress. Opinions differed: I was for turning to the right, and attempting a diagonal descent along a face of rock and snow — the back of the aiguille whose base we had been skirting. Balmat and Cachat, on the other hand, advised that we should make a steep and rapid ascent in the other direction; and, gaining the level of the Glacier du Tour, from which we had descended into the hollow, should continue along the edge of the steep *arête* which raised it above the Glacier de Trient, till we reached the extremity of the amphitheatre. Here the direction

of this boundary wall to the Glacier de Trient took a sharp turn to the north. The actual line in which these two steep walls of ice met (the one running westward, the other northward, from the line of junction) presented, of course, a more gentle inclination than either of the walls themselves, just as the slope at each corner of a square earthwork would be less than down either of the sides. By this pointed ridge, they thought we might best descend to the Glacier de Trient; and, though I did not much like the look of the place, I yielded at once to their greater experience.

We found some rocks jutting out here and there along this ridge, which greatly facilitated our progress. It was, however, a matter of considerable difficulty, for the ice was hard and very slippery, and the snow not deep enough to be of much service. The descent that lay before us was the nearest approach to the last *aréte* of the Wetterhorn that I have ever met with. After breaking through an overhanging cornice of frozen snow, we began our descent with much caution, making free use of the ropes. After a while we came to two rocks, about fifteen or twenty feet apart, each upon the very edge of the ridge, which was here somewhat more deeply covered with snow. Balmat and I were the first, and we thought we might venture to slide from one rock to the next, and so avoid the labour of step-cutting, and the tedious precaution of using the ropes. *We* reached the lower station in safety; but R., who came next, lost his direction, and was going over to the left, down a fearful slope of ice three or four hundred feet high, too steep for us to see in what it ended, but separated, in all probability, by a *bergschrund* from the Glacier de Trient; for we found one at the foot of the

gentler slope on the right. It was a terrible moment, as there was only one chance. It was utterly impossible for him to stop himself, or for either of the men to help him. Balmat was already some distance below, cutting steps, and Cachat was engaged with W., twenty or thirty paces higher up. R. showed great presence of mind. He did not utter a word, but threw himself on his right side, so as to pass as near to the edge as possible, and stretched out his arm for me to grasp. Fortunately he passed just within my reach, and I was able to catch his hand and arrest his progress, otherwise it might have been a very sad day for all of us. I think both our hearts beat quicker than usual for a few moments; but R., with great prudence and forbearance, said nothing that could shake our nerves, and sat down quietly against the stone, while I set to work and cut a set of steps, by which W. and Cachat descended without the risk of a similar mishap.

We were still, however, a long way from the bottom of the slope, and could not see what lay beneath us at its foot, but nearer the head of the glacier a great *bergschrund* separated the steep bank of ice, on part of which we stood, from the more level surface beneath; and, as this appeared to grow wider as it approached us, it was deemed advisable to cut a descending path along the side of the *arête* towards the narrower part of the crevasse. We had but one ice-hatchet, so that one man only could work at a time; and the rest of us sat down upon a block of stone to partake of the first food we had tasted since leaving the Col de Balme, while Balmat began to cut the steps. It was very hard labour, and, for the first time in my experience, Balmat owned himself fairly exhausted when he came back. He was quite breathless, looked worn

and haggard, and tossed off a glass of kirschwasser with more eagerness than I had ever seen him exhibit. Cachat changed places with him, and completed the few steps Balmat had left unfinished; and we then crawled one after the other along this precarious footway, with the pleasant consciousness that if we slipped there was a good wide crevasse to receive us at the bottom. The footsteps brought us to within a few yards of the *bergschrund*, at a place where the avalanches from the *arête* had choked it with soft snow, and seating ourselves on the bank, and letting ourselves go, we shot across the crevasse and landed safely on the other side.

We now crossed to the gap in the opposite wall of rocks which we had had so long in view; but it wanted only twenty minutes to four when we reached it. We found it also guarded by a moat of crevasses running all along its base, but a frail bridge of ice, over which the chamois had led the way, afforded us access to the rocks, and in a few moments we had all scrambled up, and stood together on the top of the ridge. We cast a look back upon the formidable *arête* down which we had cut our way; it looked very grand and imposing, and we did not like the view the worse for the well-marked trail we had left upon its smooth white surface.

A partial clearing in the mist, while we were on the *arête*, made us suspect that we had not taken the easiest course, and, just before arriving at the gap, the sky cleared sufficiently to show us that had we followed the course I had suggested when we first came in sight of the Col, we should easily have reached it in ten minutes. But the state of the ice and snow varies so much from year to year, that it would be impossible to conclude that this would

always be the case. In such passes as this, there are certain landmarks which must be observed, and certain spots which must be passed; but all the details of the route must be determined by the accidents of season and weather.

It would be impossible to imagine a wilder passage than the narrow gap through which we were now crossing the main chain of the Pennine Alps. We were amongst the most shattered rocks I ever saw, and on either hand aiguilles towered above our heads in every fantastic shape. One, which we named the Aiguille Balmat, lurched fairly over, and seemed ready to fall upon us. It had not been visible at first on account of the mist, and this heightened the imposing effect produced, when, on looking through the fog, we saw it looming vast and threatening just above our heads. The gap itself was not more than four or five feet wide, so narrow and so definite, that, on W.'s calling it "*la fenêtre,*" we adopted the name at once as being the most descriptive we could give it.

The Glacier de Salena lay still some hundreds of feet below us, and we had a bad descent over ice-clad débris before we could reach it. Fortune was still against us. When Balmat had last been here, he and his companions had been able to make a glissade, by which they accomplished in a few seconds what to us was a toilsome affair of nearly half an hour. It was only when we were fairly landed on the great snow slopes of the main part of the glacier, and were released from the necessity of cautiously picking our steps, that we could look about us and fully appreciate the magnificence of this great and wonderful glacier. On our right, lay the stupendous chain of rocks hemming in the head of the Glacier de Salena, and forming

a gigantic terrace, upon which the Glacier du Tour is raised hundreds of feet above its neighbour, effectually preventing access from the one to the other by the col that looks so easy from the head of the Glacier du Tour. They stretched away in a long serrated ridge of huge black precipices, broken by patches of unmelted snow, and curving backwards as they receded from us, so that at last they formed a wild and deep recess or bay, whose upper extremity we could not see, but which must run up near to the back of the Aiguille d'Argentières. It was a grand scene of sublime desolation, and its effect was not a little heightened by this mysterious recess, which left something for the imagination to do in filling up the details of the picture. The passage by which we had crossed the main ridge led—not to a point half way between the northern and southern boundaries of the glacier, but—to its north-eastern angle, close to the origin of the great spur separating the glacier of Salena from that of Orny; its opposite or southern boundary was a vast range of crag and glacier, the immense height of which above even our elevated position brought strikingly home to the mind the prodigious scale of the chain of Mont Blanc, while its great length, and its gentle declivity towards the east, gave to the view a character quite different from anything we had been accustomed to associate with the southern side of the great chain. The greatest mass rises some distance below the head of the glacier, and may well be compared in grandeur, if not in actual magnitude, to the Grandes Jorasses, to which it bears no inconsiderable resemblance.

In the far distance, in front of the descending traveller, the Mont Vélan rises to a height which seems the greater because it towers far above all the intervening ridges.

When we saw it, the peak just overtopped the clouds; and I think there must have been considerable refraction, for it looked higher than any mountain I ever saw, though we could not have been much less than 11,000 feet high when we passed through the gap above the head of the glacier. Indeed, we had great difficulty in persuading ourselves that it was the Vélan; we thought Mont Blanc himself could scarcely have been so high above us.

But the most wonderful part of the prospect was the chain of rocks which towered in imposing magnificence on our left; and which, so far as I know, is not to be seen from any of the ordinary points of view in the neighbourhood of Chamouni. Its general direction is such as to form an obtuse angle with the broken line of lofty precipices forming the eastern boundary wall of the Glacier du Tour, and before leaving that glacier, we had already passed beneath one or two peaks of the same general character; but it is only above the Glacier de Salena that they attain their full richness and grandeur. They are broken and shattered to no common degree; but their peculiar characteristic is that they are of a deep ruddy yellow. Professor Forbes, as Balmat told me, named them, very happily, "Les Aiguilles Dorées," and they constitute the great feature of the pass. They extend from the base of the Aiguille du Tour to about half way down the Glacier de Salena, and form a group of the most massive dimensions, and of the most wild and rugged aspect. Here and there upon their sides is a small patch of scanty vegetation, but this is of rare occurrence; they are generally quite bare. They are traversed in every direction by long lines of disruption, which look like intersecting threads of a different rock Bathed in the full tide of the summer sunlight, they

beamed with a ruddy glow, which might well suggest the hues of molten gold, and which, if the painter dared to transfer it to his canvas, would be set down as an experiment on the credulity of the beholder. A hardly less striking characteristic of the scene is the great number and size of the affluent glaciers of the Salena. They pour down from every break in the Aiguilles Dorées, as well as from the huge snow-capped heights on the opposite side of the glacier.

When Balmat had made the passage before with Professor Forbes, they had descended for an hour, or an hour and a half, down the middle of the glacier, and, after passing through a perfect maze of crevasses, had found it necessary to take at length to the rocks on the right, and to clamber beneath some small but very unpleasant glaciers, which come down from the crags above, and overhang the Glacier de Salena. We thought it worth while to try another passage, and accordingly left the central part of the glacier, before arriving at the region where the crevasses are so numerous, and ascended towards the left beneath the base of the Aiguilles Dorées. In this direction, the wall of crags forming the boundary of the upper system of affluents to the main glacier retires considerably, so as to form a kind of bay or amphitheatre. The further extremity of this rocky chain stretches forward into the channel of the central stream, and forms a kind of promontory, at the base of which it flows round to the left, so that the lower portion is hidden by the projection. The swelling surface of the glacier on our left, which bounded our view in the direction we took, seemed to promise a direct communication with the opposite side of the promontory; and as we knew that the path to Orsières lay

to the left of the glacier, we hoped thus to gain considerably in point of time, as well as to avoid passing beneath the overhanging glaciers on the right. We therefore made a long and rather steep ascent, first over beds of snow, and afterwards crossing a vast accumulation of débris, which had fallen from the heights of the Aiguilles Dorées, and now formed a sort of spur to the chain; and arrived at length on the brink of the precipitous rocks overhanging the lower part of the Glacier de Salena. The view, as may be imagined, was very magnificent. The glacier was at least 2000 feet below us, but so close, that a stone dislodged from where we stood, would not have rested till it reached its surface, or the bottom of one of its crevasses. The day was now far spent, and R. had unluckily fallen very lame from the effects of an old injury to the knee, and, with the uncertainty as to whether a descent was practicable or not, we did not venture upon trying it. There was no resource, therefore, but to regain the level of the glacier to the right as quickly as we could, and making our way through the labyrinth of crevasses to the other side, to trust to the forbearance of the small overhanging ice-streams. Pressed as we were for time, we could not help stopping for a few moments, as we passed a very curious pool of melted snow of considerable extent, lying in an unexpected hollow in the rocks, near the top of the glacier, in whose motionless and pellucid waters the grand peaks of the Aiguilles Dorées were perfectly reflected.

A steep scramble, not unlike the descent of the rocks of La Tête, in the valley of Fée, conducted us to the edge of the Glacier de Salena. I had for some time past abandoned all hope of sleeping under a roof that night, and

was much relieved by finding on the lower part of these rocks a quantity of dwarf rhododendrons. "À présent," I said to Balmat, "nous sommes sauvés; le feu, au moins, ne nous manquera pas ce soir." Balmat, with whom the wish was father to the thought, still hoped to reach Orsières, and would not admit the necessity of a bivouac. But R.'s lameness was increasing, and this rough descent tried him severely, and we had entered the ascending shadow of the opposite peaks long before we reached the foot of the rocks. The descent ended in an abrupt precipice, down the face of which we had considerable difficulty in finding any passage at all. Balmat and I pressed on ahead, in order to explore the way, and, while doing so, I was nearer making an end of my expeditions than was at all pleasant. My companions were still entangled in a mass of broken débris which we had quitted, when a large stone dislodged by one of them came bounding after me. I heard it coming, and, as I thought, leaped aside from its path, when suddenly it struck against a rock not many yards from me, and was hurled with a frightful velocity right at my head. There was a boy mentioned in Drinkwater's "Siege of Gibraltar" who possessed the useful faculty of seeing the cannon balls coming, and was able to call out to the soldiers in time for them to save themselves; but I doubt whether his skill would have availed him much if the battery had been within a hundred yards of him, and I cannot ascribe it to any dexterity on my part that the missile passed within an inch or two of my head, instead of striking it. I mention the circumstance as an illustration of the great caution that is necessary in ascending or descending steep and stony *arêtes*, where any one is likely to be beneath you. I had in this instance a most narrow

escape, and yet the danger was not of a kind that one would have thought much of beforehand.

On reaching the glacier, every lingering hope we any of us had cherished, that it might be possible to weather the promontory round which the glacier flowed, was extinguished. The rock was worn so smooth and polished, that a chamois could not have made his way along its surface, and between it and the glacier were yawning chasms, whose depth we could not tell, effectually barring our progress in that direction. The ice was too much broken to afford us the means of passing *down* the glacier itself. There was nothing left for us, therefore, but to cross the glacier, which we effected without difficulty, and to clamber a considerable height up the crags on the opposite (or southern) side. This was a most unpleasant and fatiguing business, for our path lay over a mass of yielding moraine and débris brought down by the glaciers above us. Thus late in the afternoon, however, there was less risk than there would have been at mid-day, and we passed beneath them without accident. A few paces further, we reached the top of a shoulder of rock, and seeing, for the first time, the lowest portion of the Glacier de Salena, were able to form a fair estimate of our chance of reaching Orsières that night. We had to descend from a thousand to fifteen hundred feet before we could regain the level of the glacier, and we had not yet made half the distance from its origin to its extremity. After getting down to its surface, we had still to recross the glacier by a difficult passage, and to pick our way for the best part of a mile through a huge accumulation of boulders, intersected by glacier torrents, before we could attain the opposite bank. The rays of the sun had altogether disappeared

from our neighbourhood, though, on looking back, we saw the summits of the Aiguilles Dorées bathed in a flood of golden light. Balmat still clung to a hope that we might find a cattle-track, on this side of the glacier, by which we might venture to descend in the night; but any lingering thought of bed was dispelled in my breast the moment we had crested the ridge, and all my energies were thenceforth directed to finding a tolerable encamping ground. We now scrambled down a very steep couloir for hundreds of feet, sometimes painfully groping our way among the loose stones, sometimes able to slide for a considerable distance on the fine compacted débris of centuries. The glacier below us came tumbling over a ledge in its bed, like the Talèfre below the Jardin. A precipitous ravine was crossed with some difficulty, and at length, to our great satisfaction, we emerged on to some rocky slopes abundantly covered with dwarf rhododendrons, junipers, and other mountain shrubs.

Here it became quite dark; but we had found a sheep-track, and we thought it must lead somewhere, and accordingly pressed on very eagerly, that we might descend as far as possible before halting. We passed many a group of rocks and boulders which would have afforded us some sort of shelter for the night, but unluckily there was no water near, and, tired as we were, and unprovided with wine, we felt that water was a necessity. At length we found the precipices above fast closing in upon us, and, on feeling our way with our hands beneath one huge slab of rock, we found the herbage moist and rank, and discovered, with a great deal of trouble, a place where water dripped at the rate of about a drop a second. We heard, however, the rushing of a torrent,

some distance beneath, and determined to try and reach it. We floundered down for about ten minutes, now stumbling against the rocks, now slipping over the herbage wet with dew, now entangled in the bilberry bushes; but, like the deceptive promise of the mirage, the further we advanced the more the sound appeared to recede. We halted for a few minutes, while Balmat ventured on by himself, and instantly disappeared in the darkness. He was gone so long that we began to get seriously uneasy about him, as he had ceased to answer to our shouts; but at length he hailed us from far below, with the consolatory advice to stay where we were. We shouted every minute to guide him back to us, and presently he returned, saying that he had descended to the edge of some frightful precipices, when he dared go no further; that he had found a grove of pine trees, which would have given us excellent shelter and fuel, but that there was no water. He had followed the sound of the water, which led him back again, until he came to the edge of a steep ravine, at the bottom of which the water was dashing fast enough, but which it was impossible to descend in the dark. He thought, therefore, that we had better bear towards the upper part of the glacier and reascend, so as to strike the torrent, if possible, in a less inaccessible part. Weary and footsore, we stumbled back again for about a quarter of an hour, when the men both declared that it was not safe to go any further, and we must light a fire and trust to finding some water by the aid of its light. In passing through the fir wood, Balmat had laden himself with dry and rotten sticks, and on returning from our last halt we had all of us laid hold of everything in the shape of a stick we could find, so that we had no great difficulty in lighting

a fire with the help of a box of vestas from my knapsack. Fortunately, there were plenty of dwarf shrubs about, chiefly bilberries; but mingled with these were rhododendrons, which give a warm and blazing fire; and, as the weather was very fine, we hoped to pass the hours till morning without any serious discomfort, while I, certainly, was not sorry to add to my stock of Alpine experiences that of a night spent beneath the blue canopy of heaven.

It was a quarter past eight when we halted, and nearly nine before our fire was fairly burnt up. Then Balmat and Cachat, taking each a brand, set forth on a voyage of discovery; and were fortunate to find water trickling over a slab of rock a few hundred yards from our bivouac. We were almost tempted to change our quarters, but there was more grass and there were fewer shrubs by the water, so we determined to stay where we were. The slight repast we had taken while on the *arête* above the Glacier de Trient was the only food we had tasted since leaving the Col de Balme, and, as we knew that we had been careful not to overload our guides, it was with some anxiety that we examined the contents of the knapsacks. We found a small quantity of mutton, and three or four pounds of bread, half a flask of kirschwasser, a few raisins, some chocolate, and a tolerable supply of sugar; not too much for five men who had been walking more than twelve hours. Happily, Balmat had some citric acid and lemon essence in his pocket, by the help of which and the sugar we turned the water into an excellent and most refreshing lemonade. Still, we had to sup on half rations, or something less. My companions fortified themselves against the cold with kirschwasser; but to me it is a

nauseous and horrible compound, which nothing but necessity would induce me to touch, so that I was fain to content myself with the lemonade; rather a cool "night-cap" on the bare mountain side.

Before lying down to seek such rest as we could get, we divided the night into five watches. We considered that soon after four we might hope to be on the move, so that an hour and a quarter apiece would carry us through the night. We resolved to take the first three watches ourselves, as we knew we could not trust Balmat or Cachat to waken us if we should sleep, and they stood greatly in need of rest. We drew lots, and it fell to R. to keep the first watch, to myself to keep the second, and to W. the third. It was not till we came to lie down that we fully appreciated the comfort of our bivouac. The slope on which we were encamped was so steep, that no one who was not fortunate enough to find a hole in which to nestle could keep himself from slipping, especially as the bilberry bushes on which we lay were soaking wet with the heavy dew. W., who is great at sleeping, with admirable instinct found a most eligible hollow close against the fire, where the only danger he incurred was that of being scorched; but it was the only place of the kind, and after trying every spot which seemed to give the slightest promise of support, and finding that nowhere could I keep myself from slipping down, except by clinging to the wet bushes, I was obliged to desert the fire and betake myself to the under side of a boulder about thirty yards off, where I had the double advantage of a hollow to sit in and a back to lean against. Here I tied my handkerchief over my head, and tried to think I was very warm and comfortable; but I was not so successful but that I was very

glad when Balmat brought me a large stone, which he had heated in the embers of our fire, to sit upon.

It was a night I would not have missed, with all its inconveniences. The stars shone bright and clear out of the sky of jet; not a wreath of vapour could be seen; the solemn glacier far beneath us showed dimly through the gloom with a dead and spectral white, as if it had been some mighty giant lying in his shroud. The crags beyond it were sombre as a funeral pall, and, in the darkness, seemed to rise to such an enormous height, that the eye grew weary of wandering upwards, before their massive ebony was relieved by the liquid and transparent blackness of the sky, with its thousand glittering points of light. Not a sound broke the awful stillness of the scene, except the faint dashing of the distant torrent, which we had sought so unsuccessfully, and the crackling of the fire as R. heaped upon it fresh armfuls of bilberries and rhododendrons. Occasionally, by the fitful glare of the flames, I could see his form moving slowly and noiselessly about, now in bold relief against the ruddy light, now half hidden by the curling smoke, now illuminated by the blaze, as he passed round to the other side in search of fuel, quite unconscious of how much he was adding to the picturesqueness of the scene. I could not help thinking of home, and of those who not improbably were at that very moment thinking of me, little dreaming that I was lying out on the side of a glacier, many a thousand feet above the sea, with nothing between me and the blue vault of heaven. It was a pleasant thought, and led me gently back to another bivouac beneath a rock by the Lac de Tacul, and thence to many an Alpine wandering enjoyed in the same good company; and at length I was passing

gently from reverie to sleep, when, alas! the inexorable voice of R. proclaimed that a quarter past eleven was come, and that it was my turn to feed the fire, instead of indulging in the pleasures of memory or the luxuries of imagination.

We changed the watch very successfully, without disturbing either W. or our jaded guides, each of whom had provided himself with a hot stone and was lying among the bushes, a few yards higher than our fire. R.'s knee was by this time very painful and sadly wanted repose, but he could not find a tolerable resting-place anywhere near the fire, and was obliged to hold on by the shrubs as he lay; but he wisely kept as quiet as he could, and, for all the signs of life he gave, might have been buried in the profoundest slumber. Had I had much time for reflection, I think I should have been impressed with the solemnity of the scene even more than when I was contemplating it from my den beneath the rock, for now I had a more uninterrupted view of the dark prospect on every hand, and, as I walked about amongst the prostrate motionless forms of my companions, I felt as if I was the only living thing within sight or ken. There was not, however, much time for such thoughts, for it was full occupation for one man to feed the fire. The bilberry bushes that one tore up by handfuls were gone in no time. There was a hissing, a little cloud of smoke, and a crackling blaze, and then there was an end of them. The rhododendron twigs burnt with a bright and cheerful glow, and threw quite a flood of light over our little encampment; but they hardly lasted so long even as the bilberries. The junipers had rather more substance, but were full of prickles, and hurt the hands; so that it was really hard work to keep the fire up to the mark; and I found it continually necessary

to widen the area of search. I was lucky enough to fall in with a very respectable alder tree, which I was able to cut in pieces with the saw blade of a large knife; and this was the best *pièce de résistance* I met with: but I cannot say I was sorry when half-past twelve was fairly come and past, and it was W.'s turn to take my place. I had some trouble to rouse him; but, once awake, he proved an admirable forager, and R., who took his comfortable place, now got some chance of rest and sleep. It was become too cold to go back to my former nest, so I heated a stone to sit upon, and another for my feet, and kept myself from slipping into the fire as well as I could. I was too hungry even to think of sleep, had there been nothing else to prevent it; so I made the best of it, and watched the black sky and twinkling stars, and the curling smoke, and W. feeding the fire, and thought of home and a thousand other pleasant subjects, amongst which the idea of a bed the next night at the St. Bernard, after a hot supper and a draught of their good red wine, was, I must own, most sensually prominent.

Balmat and Cachat came down before W.'s watch was ended, driven from their lairs by the increasing cold, and looking weary and haggard enough. I wondered whether I looked as tired as I thought all my companions did. After two o'clock, I doubt if any one slept a wink, except perhaps R., who was snug in W.'s berth; for the cold became intense, and now and then a wreath of vapour from the valley below drifted past us, wrapping us in its cold grey folds and chilling us to the very bones. And now we began to watch eagerly for the daybreak, for the sense of discomfort began rapidly to overpower every other feeling. You cannot—at least I never could—appreciate the pic-

turesque, while the teeth are chattering with cold and the inner man loudly proclaims its detestation of that which nature also abhors. That pale grey tint which steals over the eastern sky so imperceptibly that you hardly know it is there, save for the sicklier glitter of the stars, how long before the dawn it shows itself! how slowly does it ripen into light! how it seems to intensify the power of frost, and to give a sharper edge to the keenness of the wind! It was the most protracted daybreak I ever remember. Again and again did I turn my eyes resolutely away, that I might be sure, on looking again, to see some signs of the advancing day. Again and again was I doomed to disappointment, the only change perceptible being that the sky looked colder and more pitiless than before: the wind also was brisker and shrewder, and wherever you posted yourself for a warm at the fire, in an instant the breeze set in that direction, and you were smothered and half-blinded by the smoke. But

> "come what come may,
> Time and the hour runs through the roughest day;"

and at last the grey faded into white, the white deepened into yellow, the yellow kindled into a faint red blush, and the highest peaks of the Aiguilles Dorées were once more tipped with the welcome light of day. Our bivouac was ended, and, having nothing to eat, we ate it, packed up our knapsacks, and girt ourselves for our onward journey.

We had quite lost the sheep-track of last night, and Balmat set forth alone to find the best way down to the glacier. As it grew lighter we had a better view of our position, which was certainly not an inviting one. The slope of the mountain was so steep that our watch-fire had descended

bodily several feet during the course of the night, and, at a very short distance below us, the bank ended in some formidable precipices. I cannot say much more for our personal appearance than for the character of our accommodation. With dress disordered, with boots and trowsers first sodden with tramping through the wet herbage, and then powdered with the ashes of our fire, with hair unkempt, with faces and hands grimed with soot and smoke, we looked like anything but reputable folks. However, there was no help for it, and we felt that any attempt to smarten ourselves would be out of place till we were a little less cold and uncomfortable. In about twenty minutes Balmat came back, his trowsers wet through up to the thighs with forcing his way through the scrub and underwood. We now gathered up our traps, and at a quarter to five bade farewell to our encampment, and trudged downwards to the glacier. We were further from it than I should have supposed, and it took us a whole hour of very steep and fatiguing descent, before we reached the lateral moraine, which was of great size, and seemed to us unusually rugged. Here we rejoined the sheep-track, which passed along the top of the moraine, and at length descended into a hollow between a perpendicular wall of rock on the right and the glacier on the left. It was obvious that we should gain considerably if we could follow this path down to the Val Ferret, instead of crossing the glacier and descending on the other side. But some large boulders, perched upon a very steep declivity of ice just overhanging the path, induced us to display the better part of valour, and we took to the glacier at once. It rises here in magnificent pyramids and ridges, being almost as much broken as the Talèfre; but we pushed on steadily and vigorously, like

men who knew that Orsières and breakfast were synonymous, and, by a quarter past six, were safely landed on the opposite moraine, by the side of a clear mountain rill, which expanded itself, as if to suit our convenience, into a pool of crystal water. The knapsacks were instantly unshouldered, and brushes, combs, sponges and soap speedily at work. Most of us stripped and enjoyed the luxury of a thorough wash, though there was nothing but the sunshine and a pocket handkerchief to stand us in the stead of towels. It was wonderful what a change was wrought in a few minutes. We left the glacier a set of unwashed scarecrows: we flattered ourselves we left the welcome little stream looking something like gentlemen; though, alas! with a keener appetite than before, if that were possible.

We had a toilsome way to pick, first along the great moraine of the glacier, then across a wide desert of débris and sand silted down by a number of torrents, fed partly from the Glacier de Salena itself, but chiefly from the tributary glaciers that pour from the height we had reached late yesterday afternoon. Looking up from here, we thought the descent would have been practicable though difficult, and were rather sorry we had not tried it, though we had, beyond all doubt, taken a more prudent course. A night passed half-way down those crags would have been rather worse than uncomfortable. At length, towards seven o'clock, we reached, very much to our satisfaction, the base of the mountain chain on the north of the glacier which had been opposite to our encampment, and had looked so black and frowning in the dead of night. With my telescope I took one last look at the scene of our bivouac, and could just discern the spot where our watch

had been kept — a little black patch of scorched shrubs and embers amidst the general green and grey.

We had now to mount a considerable height, and to pass through weird-like groups of blasted firs, beneath whose scarred and barren trunks the strawberries, which never would have been found there when the trees were in life and health, grew in some abundance, and occasioned us a little not unpleasant delay. Looking down from this part of our journey, we were surprised to find the glacier still rolling out its interminable length in front of us, and it was not till after the lapse of more than an hour of steep descent, behind a long wall of débris which looked like an ancient moraine, that we had the satisfaction of finding that we had left the ice fairly behind us, and were really approaching the valley of Ferret. R. was almost knocked up, and I proposed to push on and send him a mule to carry him down to Orsières; but he had no notion of being beaten, and after a quarter of an hour's halt beneath some tall pines, —the beginning of a narrow belt of noble wood which bars the lower extremity of the glacier valley, and shuts out every glimpse of the Val Ferret, — stumped resolutely onwards, determined to finish the expedition on foot with the best of us.

After a few minutes, we suddenly emerged from the wood, and found ourselves on a gentle slope of pasture land, profusely irrigated by little rivulets of the purest water, and dotted all over with the purple flowers of the autumnal colchicum. The sudden change of scene was quite startling. Our last halt had been made within a few yards of a glacier torrent, whence we had gazed back upon a scene of savage grandeur, for wildness and desolation almost without a rival even among the Alps; of

which the sole components are crag, precipice, snow, ice, and aiguille, combined in every variety of stern and awful magnificence—the very citadel of winter: a few steps had brought us into the garden of summer. The grass beneath our feet was fresh and moist, and almost dazzled the eye with the brilliancy of its emerald green. Hardly a stone's throw from us, the rich valley of Ferret stretched out on either hand, studded with châlets, dotted with sheep and cattle, sparkling with cultivation, instinct with life and luxuriant beauty. The dark masses of the great chain bounding the valley on the south were clothed with wood and herbage nearly up to the summits, and a thin veil of delicate haze which hung upon them showed how great was already the power of the autumn sun. Even the glacier torrent, which we had left on our right in traversing the wood, now flowed behind a rising ground, so that not an object was in sight to remind us of that desolate region of eternal frost we had so lately quitted.

But it is half-past nine o'clock, the sun is blazing fiercely in the clear sky, and we, who were on the march before five, have yet to reach Orsières before we can hope for a meal. So we make no pause, but hurry on, and in a few moments have gained the carriage road leading down the valley. It is curious to observe how well that great glacier is masked; the exit of the valley is very narrow and unpretending; there is nothing to lead you to suspect for a moment that it is almost within sight of one of the largest glacier systems of the Alps, and ten minutes after you are on the road to Orsières hardly a trace of its existence is to be seen.

The rest of our way was hot and dusty enough; the

sun shone directly in our faces, and though the berberry bushes lined the road in rich profusion, yet not one berry of all those countless thousands which hung in graceful crimson clusters from every branch and spray, and seemed to offer welcome refreshment to our parched mouths, was ripe or sweet; so that, in spite of the smiling plenty and richness of the valley of Ferret, we were glad enough when another valley began to open on our right, and a straggling village, at the foot of a steep declivity on the face of which were traced the long white zig-zags of the St. Bernard road, appeared in sight, and defined at length the limit of our morning's walk. Balmat and I pressed on apace, that no time might be lost in preparing an ample indemnity for the enforced abstinence we had submitted to, but it was half-past ten, nearly six hours from our bivouac, before we reached our destination.

R., I felt sure, would need rest before he could eat, and W. and I should want to indulge in copious ablutions, which would be succeeded, in the case of W., by a dilatory toilette (at which he is no mean hand); so I was fain to put off the hour of triumph a little longer yet, and ordered dinner at twelve, an arrangement which met the approval of my friends when they arrived: but, when we were washed and dressed, we began to repent of our forbearance; and I, in particular, was accused of displaying the most sensual and unromantic hankering after the flesh-pots. Of course, dinner was half an hour late, as we were ravenous; but, when it did come, we distinguished ourselves. Nothing was amiss to any one; it was all fish that came that day to the net, and we felt ourselves almost constrained to apologise to the landlady for our appetites.

That afternoon, we started for the St. Bernard, and two days afterwards re-crossed the great chain and returned to

Chamouni by the Col du Géant. We had many discussions on the comparative merits of the two passes. Balmat maintained that the Aiguilles Dorées gave to the Glacier du Tour a decided superiority; but for my own part, after having repeated the passage of the Glacier du Tour, and having three times crossed the Col du Géant, I am compelled to give the palm to the latter. The passage of the Séracs surpasses, so far as my experience goes, everything else of the kind, except perhaps the upper part of the Glaciers des Bossons and de Taconnay; while the boundless view of the glaciers and mountain chains of Piedmont, which is seen to the south of Mont Blanc, is one that strikes my imagination with uncommon force. On the passage of the Glacier du Tour there is hardly any distant prospect to be seen; and from the enormous length of the Glacier de Salena there is a certain degree of monotony in the latter part of the day's journey. Still, it has attractions of its own of no common order, and presents combinations of glacier and crag of unsurpassed magnificence; and I cannot do better than by recommending every one who has time and strength to spare to try both passes, and determine for himself which is the more interesting. It is quite possible he may have to perform both journeys twice before he will be able to make up his mind; and if he has made either once, he is sure to long for the opportunity of repeating the expedition.

It only remains for me to mention, as an additional inducement to attempt the passage of Le Tour, that it is not included in the Chamouni tariff, and that the traveller is therefore at liberty to make his own bargain as to the number of his guides and the remuneration of each. I do not think that there are at present half a dozen guides

who have made the passage. The direction is easy enough to find, but there are some formidable difficulties to be overcome, and it will be seen from our experience that there may be occasion for a very skilful ice-man. It is certainly not a pass to be undertaken without good guides; and if only a small number are employed, care should be taken to keep down the amount of baggage to the lowest possible quantity. There may be a great deal of heavy work to be done, and the pass is very long. Thirty francs seems to me a reasonable price for each guide, and I apprehend most of them would be well satisfied with that sum. Provisions can be procured good, and on reasonable terms, at the Col de Balme, where the inn has passed into the hands of very civil, honest, and intelligent people.

ALFRED WILLS.

NOTE. — Reference has been made, at p. 4, to the incorrectness of the common maps, so far as this end of the Mont Blanc chain is concerned. The map of Mont Blanc given in this volume was corrected from a reduced copy of a map in Johnston's Physical Atlas, which is no doubt compiled from the most authentic sources. It is no exaggeration to say, that the whole of the eastern portion of the chain is a pure effort of imagination. Auguste Balmat was in London while the map was in preparation, and he and I are responsible for the portion of it east of the Aiguille d'Argentières. We found it necessary to throw down mountain ranges, to create glaciers to fill their places, and in fact to take the most revolutionary proceedings with respect to this part of the king of Sardinia's dominions. It was impossible, in the uncorrected map, to recognise a single feature of the actual topography. The present map lays, of course, no claim to absolute accuracy; the corrections were made merely from memory and general knowledge of the district; but it is free from the gross blunders of its predecessors. The general direction of the Glacier de Salena is fixed with exactness by the fact that the Mont Vélan is seen from the head of the glacier, as you look down it. Mr. Johnston's map is said to be drawn from the actual surveys of several Alpine authorities, at the head of whom stands Professor Forbes, his name appearing in large letters. It is right to mention, that the only portion for which Professor Forbes's surveys are answerable is the Mer de Glace and the adjacent glaciers and aiguilles.

CHAP. II.

A DAY AMONG THE SÉRACS OF THE GLACIER DU GÉANT.

HAVING been requested by the editor of this volume to give some account of an ascent of the Col du Géant which was accomplished in the month of July 1857, I have endeavoured, as far as my engagements will permit, to comply with his wish. It is, however, scarcely in my power to do more than give a rapid summary of the incidents and impressions of the excursion; and I must ask the reader to accept it as the best I can offer under the circumstances.

Having fixed my head-quarters at the Pavilion of the Montanvert, I was engaged for nearly six weeks during the summer of 1857 in making observations on the Mer de Glace and its tributaries. Throughout this time I had the advantage of the able and unremitting assistance of my friend Dr. Thomas Hirst, who kindly undertook, in most cases, the measurement of the motion of the glacier. My permanent guide, Edouard Simond, an intelligent and trustworthy man, was assistant on these occasions, and having arranged with Dr. Hirst the measurements required to be made, it was my custom to leave the execution of them to him, and to spend much of my time alone upon the glaciers. Days have thus been occupied

amid the confusion of the Glacier du Géant, at the base of the great icefall of La Noire, in trying to connect the veined structure of the glacier with the stratification of its névé; and often, after wandering almost unconsciously from peak to peak and from hollow to hollow, I have found myself, as the day was waning, in places from which it required a sound axe and a vigorous stroke to set me free.

This practice gradually developed my powers of dealing with the difficulties of the glacier. On some occasions, however, I found the assistance of a companion necessary, and at such times it was my habit to take with me a hardy boy named Balmat, who was attached at the time to the hotel at the Montanvert. He could climb like a cat, and one of our first expeditions together was an ascent to the point above Trelaporte, marked G on the annexed map, from which a magnificent view of the entire glacier is obtained. This point lies to the left of a remarkable cleft in the mountain side, beneath the Aiguille de Charmoz, which is sure to attract the traveller's attention on looking upwards from the Montanvert. We reached the place through a precipitous *couloir* on the Montanvert side of the mountain, and while two chamois watched us from the crags above, we made our observations, and ended our survey by pledging the health of Forbes and other explorers of the Alps.

We descended from the eminence by a different route, and during both ascent and descent I had occasion to admire the courage and caution of my young companion, and the extraordinary cohesive force by which he clung to the rock. I ought perhaps to mention his *firmness* also. He evidently felt himself responsible for

my safety, and once when I asserted my independence so far as to attempt descending a kind of "chimney," which, though rather dangerous looking, I considered to be practicable, he sprang to my side, and, with outstretched arm and ringing voice, exclaimed, "*Monsieur, je vous défends de passer par là!*"

Anxious to avoid the inconvenience which the rules of the Chamouni guides were calculated to impose upon me, my aim, from the first, was to render myself as far as possible independent of their assistance. Wishing to explore the slopes of the Col du Géant, not for the purpose of crossing into Piedmont, but to examine the fine ice sections which it exhibits, and to trace amid its chasms the gradual conversion of the snow into ice, I at first thought of attempting the ascent of the Col alone; but "le petit Balmat," as my host at the Montanvert always named him, acquitted himself so well on the occasion referred to, that I thought he would make a suitable companion. On naming the project to him he eagerly embraced my proposal; in fact, he said he was willing to try Mont Blanc with me, if I desired it.

On the morning of Friday, July the 24th, we accordingly set off for the Tacul, I making, as we ascended, such few observations as lay in our way. The sun shone gloriously upon the mountains, and gleamed by reflection from the surface of the glacier. Looked at through a pair of very dark spectacles, the scene was exceedingly striking and instructive. Terraces of snow clung to the mountains, exposing, here and there, high vertical sections, which cast dense shadows upon the adjacent plateaux. The glacier was thrown into heaps and "hummocks," with their tops glistening with white, silvery light, and their sides in-

tensely shaded. When the lateral light was quite shut out, and all that reached the eyes had to pass through the spectacles, the contrast between light and shade was much stronger than when the glacier was viewed by the broad light of day. In fact, the shadows were no longer grey merely, but black; a similar augmentation of contrast towards the close of day explains the fact that the "Dirt Bands" of the Mer de Glace are best seen by twilight.

A gentleman had started in the morning, to cross the Col, accompanied by two strong guides. We met a man returning from the Jardin who told us that he had seen the party that preceded us; that they had been detained a long time amid the séracs, and that our ascending without ladders was quite out of the question. As we approached the Tacul, my lynx-eyed little companion thought he could see the travellers; but on looking through the telescope, he found that he was mistaken. However, he continued to range, with the glass, over the snowy slopes of the Col, and at length exclaimed, "*Je les vois, tous les trois!*" — the "Monsieur" in the middle, and a guide before and behind. They seemed like three black specks upon the shoulders of the Giant; below them, was the vast ice-cascade, resembling the foam of ten Niagaras placed end to end and stiffened into rest, while the travellers seemed to walk upon a floor as smooth as polished Carrara marble. Here and there, however, its uniformity was broken by vertical faults, exposing precipices of the stratified névé. On pointing my opera-glass downwards, and looking obliquely through it at the pass and mountains, every spike of rock became a pointed flame, every snow patch resting on the brown rock, every rock protruding from the white snow, had its fringe of glory

which no artist could imitate. If beauty of colouring, instead of sharpness of outline, were the thing desired, nothing could be more magnificent than this resolution of the solar light by the virtual prisms formed by the lenses of the opera-glass.

On an old moraine near the Tacul, piled up centuries ago by the Glacier de Léchaud, immense masses of granite are thrown confusedly together; and one enormous slab is so cast over a number of others as to form a kind of sheltered grotto, which we proposed to make our resting-place for the night. Having deposited our loads here, I proceeded to the icefall of the Talèfre, while my companion set out towards the Couvercle in search of firewood. I walked round the base of the cascade, and climbed up among its riven pinnacles, examining the structure as I ascended. The hollow rumble of the rocks as they fell into the crevasses was incessant. From holes in the ice-cliffs clear cataracts gushed, coming I knew not whence, and going I knew not whither. Sometimes the deep gurgle of sub-glacial water was heard, far down in the ice. The resonance of the water as it fell into shafts struck me suddenly at intervals on turning corners, and seemed, in each case, as if a new torrent had bounded into life. Streams flowed through deep channels which they themselves had worn, revealing beautifully the "ribboned structure." At the further side of the Glacier de Léchaud the Capucin Rock stood, like a preacher; and below him a fantastic group of granite pinnacles suggested the idea of a congregation. The outlines of some of the ice-cliffs were also very singular; and it needed but a slight effort of the imagination to people the place with natural sculpture.

At six o'clock, the shrill whistle of my companion announced that our time of meeting was come. He had found some wood,—dry twigs of rhododendrons, and a couple of heavy stumps of juniper. I shouldered the largest of the latter, while he strapped his twigs on his back and led the way to the Tacul. The sun shot his

PINNACLES OF ICE.

oblique rays against us over the heights of Charmoz, and cast our shadows far up the glacier. It was a pleasant time. Ministering thus to our own wants, we felt all the strength of independence as we strode over the ice. With body and mind in perfect order, the conscious vigour of existence was itself a sufficient joy. We filled our saucepan, which Balmat named "a machine," with the clear water of the glacier, and bore it to our cavern; where the fire was soon crackling under the machine. I was assailed by the smoke, which set my eyes dripping tears; but this cleared away when the fire brightened, and we

boiled our chocolate and made a comfortable evening meal. I afterwards clambered up the moraine to watch the tints which the setting sun threw upon the mountains; clouds floated round the Aiguille de Charmoz and were changed from grey to red, and from red to grey, as the density of the masses varied. The shadows of the isolated peaks and pinnacles were drawn, at times, in black bands across the clouds; and the Aiguille du Moine smiled and frowned alternately, as sunshine and shade fell upon its crags. One high snow-peak alone enjoyed the unaltered radiance of the sinking day: the sunshine never forsook it; but glowed there, like the steady light of love, while a kind of coquetry was carried on between the atmosphere and the surrounding mountains. The notched summits of

THE CAPUCIN ROCK.

the Grande and Petite Jorasse leaned peacefully against the blue firmament. The highest mountain crags were cleft, in some cases, into fantastic forms; single pillars stood out from all else, like lonely watchers, over the mountain scene;

while little red clouds playfully embraced them at intervals, and converted them into pillars of fire. The sun at length departed, and all became cold and grey upon the mountains; but a brief secondary glow came afterwards, and warmed up the brown cliffs once more. I descended the moraine, the smell of the smoke guiding me towards the rock under which I was to pass the night. I stood in front of it; and, had I been a painter, I had a capital subject. A fire was burning at the mouth of the grotto, reddening with its glare the darkness of the interior; beside the fire sat my little companion, with a tall, conical, red night-cap drawn completely over his ears; our saucepan was bubbling on the fire; he watched it meditatively, adding at times a twig, which sprung immediately into flame, and strengthened the glow upon his countenance; he looked, in fact, more like a demon of the ice world than a being of ordinary flesh and blood. I had been recommended to take a bit of a tallow candle with me to rub my face with, as a protection against the sun; by the light of this we spread our rugs, lay down upon them, and wrapped them round us.

The countless noises heard upon the glacier during the day were now stilled, and dead silence ruled the ice world: the roar of an occasional avalanche, however, shooting down the flanks of Mont Mallet broke upon us with startling energy. I did not sleep till towards four o'clock in the morning, when I dozed, and dreamed, and mingled my actual condition with my dream. I thought I was in company with a clergyman, for whom I entertained a strong affection when a boy, and that he wished me to go home with him. I wished to decline, as I felt weary and sleepy through some unexplained cause. I went, how-

ever, but on entering the door found that the house was full of company. The weight upon my brain became doubly manifest: "This will never do," I said, "I must return." The effort to do this brought me to my senses, and I found my head weary enough upon the clay of the old moraine, my ribs pressed closely against a block of granite, and my feet amid sundry fragments of the same material. It was nearly five o'clock on Saturday the 25th, when I arose; my companion quickly followed my example. He also had slept but little, and once or twice during the night I fancied I could feel him shiver. We were, however, well protected from the cold. The high moraine of the Glacier du Léchaud was on one side, that of the Glacier du Géant on the other, while the cliffs of Mont Tacul formed the third side of a triangle, which completely sheltered us from the sharper action of the wind. At times the calm was perfect, and I felt almost too warm; then again a searching wind would enter the grotto, and cause the skin to shrink on all exposed parts of the body. It had frozen hard, and to obtain water for washing I had to break through a sheet of ice which coated one of the pools upon the glacier.

In a few minutes our juniper fire was flaming and crackling briskly and cheerily; we made our chocolate and breakfasted. My companion emptied the contents of a small brandy bottle into my flask; which, however, was too small to hold it all; and on the principle, I suppose, of avoiding waste, he drank what remained. It was not much, but sufficient to muddle his brain, and to make him sluggish and drowsy for a time. We put the necessary food in our knapsacks and faced our task; first ascending the Glacier du Tacul along its eastern side, until we

came to the base of the séracs. The vast mass of snow collected on the plateau of the Col du Géant, and compressed to ice by its own weight, reaches the throat of the valley, which stretches from the rocks called Le Rognon, to the promontory of the Aiguille Noire. Through this defile it is forced, falling steeply, and forming one of the grandest ice-cascades in the Alps. At the summit it is broken into transverse chasms of enormous width and depth; the ridges between these break across again, and form those castellated masses to which the name of *sérucs* has been applied. In descending the cascade the ice is crushed and riven; ruined towers, which have tumbled from the summit, cumber the slope, and smooth vertical precipices of ice rise in succession out of the ruins. At the base of the fall the broken masses are again squeezed together, but the confusion is still great, and the glacier is here tossed into billowy shapes, scooped into caverns, and cut into gorges by torrents which expand here and there into deep green lakes.

Across this portion of the glacier we proceeded westward, purposing to attempt the ascent at the Rognon side.* Our work soon commenced in earnest, and perils and difficulties thickened round us as we advanced. The confusion of

* Standing here alone, on another occasion, I heard the roar of what appeared to be a descending avalanche, but the duration of the sound surprised me. I looked through my opera-glass in the direction from which the sound proceeded, and saw issuing from the end of one of the secondary glaciers on the side of Mont Tacul a torrent of what appeared to me to be stones and mud. I could see the rocks and débris jumping down the declivities, and forming singular cascades. The noise continued for a quarter of an hour, when the descending mass diminished until the ordinary stream, due to the melting of the glacier, alone remained. A sub-glacial lake had evidently burst its bounds, and carried the débris along with it in its rush downwards.

ice-pinnacles, crags, and chasms, amid which we hewed our way, was very bewildering. Plates of ice jutted from the glacier like enormous fins, along the edges of which we had to walk; and often, while perched upon these eminences, we were flanked right and left by crevasses, the depth of which might be inferred from their impenetrable gloom. At some places forces of extreme complexity had acted on the mass; the ridges were broken into columns, and some of these were twisted half round, as if with a vortical motion; while the chasms were cut up into shafts which resembled gigantic honeycombs, round the edges of which we crept tortuously. Our work was very difficult, sometimes disheartening; nevertheless, our inspiration was, that what man has done man may do, and we accordingly persevered. My fellow-traveller was silent for a time: the brandy had its effect upon him, and he confessed it; but I knew that a contact with the cold ice would soon cause this to disappear, and I resolved that when restored to his normal condition I would not influence his judgment in the least.

Looking now to the right, I suddenly became aware that high above us, a multitude of crags and leaning columns of ice, on the stability of which we could not for an instant calculate, covered the precipitous incline. We were not long without an illustration of the peril of our situation. We had reached a position where massive ice cliffs protected us on one side, while in front of us was a space more open than any we had yet passed; the reason being that the ice avalanches had chosen it for their principal path. We had just stepped upon this space when a peal above us brought us to a stand. Crash! crash! crash! nearer and nearer, the sound becoming more con-

tinuous and confused, as the descending masses broke into smaller blocks. Onward they came! boulders half a ton and more in weight, leaping down with a kind of maniacal fury, as if their sole mission was to crush the séracs to powder. Some of them on striking the ice rebounded like elastic balls, described parabolas through the air, again madly smote the ice, and scattered its dust like clouds in the atmosphere. Some blocks were deflected by their collision with the glacier, and were carried past us within a few yards of the spot were we stood. I had never before witnessed an exhibition of force at all comparable to this, and its proximity rendered that fearful which at a little distance would have been sublime.

My companion held his breath for a time, and then exclaimed, "*C'est terrible! il faut retourner.*" In fact, while the avalanche continued we could not at all calculate upon our safety. When we heard the first peal we had instinctively retreated to the shelter of the ice bastions; but what if one of these missiles struck the tower beside us! would it be able to withstand the shock? We knew not. In reply to the proposal of my companion, I simply said, "By all means, if you desire it; but let us wait a little." I felt that fear was just as bad a counsellor as rashness, and thought it but fair to wait until my companion's terror had subsided. We waited accordingly, and he seemed to gather courage and assurance. I scanned the heights and saw that a little more effort in an upward direction would place us in a much less perilous position, as far as the avalanches were concerned. I pointed this out to my companion, and we went forward. Once indeed, for a minute or two, I felt anxious. We had to cross in the shadow of a tower of ice, of a loose and

threatening character, which quite overhung our track. The freshly broken masses at its base, and at some distance below it, showed that it must have partially given way some hours before. "Don't speak, or make any noise," said my companion; and, although rather sceptical as to the influence of speech in such a case, I held my tongue and escaped from the dangerous vicinity as fast as my legs and alpenstock could carry me.

Unbroken spaces, covered with snow, now began to spread between the crevasses; these latter, however, became larger, and were generally placed end to end *en échelon*. When, therefore, we arrived at the edge of a chasm, by walking along it we usually soon reached a point where a second one joined on to it. The extremities of the chasms ran parallel to each other for some distance, one being separated from the other, throughout this distance, by a wall of incipient ice, coped at the top by snow. At other places, however, the lower portion of the partition between the fissures had melted away, leaving the chasm spanned by a bridge of snow, the capacity of which to bear us was often a matter of delicate experiment. Over these bridges we stepped as lightly as possible: "*Allez doucement ici*," was the perpetual admonition of my companion, "*et il faut toujours sonder*." In many cases, indeed, we could not at all guess at the state of matters underneath the covering of snow. We had picked up a few hints upon this subject, but neither of us was at this time sufficiently experienced to make practical use of them. The "sounding" too was rather weary work, as, to make it of any value, the baton must be driven into the snow with considerable force. Further up in the névé the fissures became less frequent, but some of them were of great

depth and width. On those silent heights there is something peculiarly solemn in the aspect of the crevasses, yawning gloomily day and night, as if with a never-satisfied hunger. We stumbled on the skeleton of a chamois, which had probably met its death by falling into a chasm, and been disgorged lower down. But a thousand chamois between these cavernous jaws would not make a mouthful. I scarcely knew which to choose — these pitfalls of the névé, or the avalanches. The latter are terrible, but they are grand, outspoken things; the ice crags proclaim from their heights, "Do not trust us, we are momentary and merciless." They wear the aspect of hostility undisguised; but these chasms of the névé are typified by the treachery of the moral world; they hide themselves under shining coverlets of snow, and compass their ends by dissimulation.

After some time we alighted on the trace of those who had crossed the day before. The danger was over when we made the discovery, but it saved us some exploring amid the crevasses which still remained. We at length got quite clear of the fissures, and mounted zig-zag to the summit of the Col. Clouds drove up against us from the valley of Courmayeur, but they made no way over the Col. At the summit they encountered a stratum of drier air, mixing with which they were reduced, as fast as they came, to a state of invisible vapour. Upon the very top of the Col I spread my plaid, and with the appetites of hungry eagles we attacked our chicken and mutton. I examined the snow, and made some experiments on sound; but little Balmat's feet were so cold that he feared being frostbitten, and at his entreaty we started on our descent again as soon as possible.

To the top of the séracs we retraced the course by which we had ascended, but here we lost the track, and had to strike out a new path for our return to the foot of the ice-cascade. A new lesson was now before us; a fresh discipline in courage, caution, and perseverance. We kept nearer to the centre of the glacier than when we ascended, thereby escaping the avalanches, but getting into ice more riven and dislocated. We were often utterly at a loss how to proceed. My companion made several attempts to regain the morning's track, preferring to risk the avalanches rather than be blocked and ditched up in an ice prison from which we saw no means of escape. Wherever we turned, peril stared us in the face; but the recurrence of danger had rendered us callous to it, and this indifference gave a mechanical surety to the step in places where such surety was the only means of avoiding destruction. Once or twice, while standing on the summit of a peak of ice, and looking at the pits and chasms beneath me, at the distance through which we had hewn our way, and at the work still to be accomplished, I experienced an incipient flush of terror. But this was immediately drowned in action. Indeed the case was so bad, the necessity for exertion so paramount, that the will acquired an energy almost desperate, and crushed all terrors in the bud. We proceeded, however, with the most steady watchfulness. When we arrived at a difficulty which seemed insuperable, we calmly inspected it, looking at it on all sides; and though we had often to retrace our steps amid cliffs and chasms, to seek an outlet elsewhere, still formidable obstacles often disappeared before our cool and searching examination. We made no haste, we took no rest, but ever tended downwards. With all our instincts of

self-preservation awake, we crossed places which, without the spur of necessity to drive us, we should have deemed impassable.

The closest approach which I made to destruction was in the following way. We had walked for some distance along the edge of a high wedge of ice, and had to descend its left face in order to cross a crevasse. The ice was of that loose granular character which causes it to resemble an aggregate of little polyhedrons jointed together more than a coherent solid. I was not aware that the substance was so utterly disintegrated as it proved to be. I endeavoured to plant my foot securely on the edge of the crevasse, and to help me to do so, I laid hold of a projecting corner of the ice. It crumbled to pieces in my hand; I tottered for a moment in the effort to regain my balance, my footing gave way, and down I went into the chasm. A wild scream burst from my companion, "*O! mon Dieu, il est perdu!*" but I escaped unhurt. A ledge about two feet wide jutted from the side of the crevasse, and to this I clung; my fall not amounting to more than three or four feet. A block of ice which partially jammed up the chasm concealed me from my companion. I called to him, and he responded by another exclamation, "*O! mon Dieu, comme j'ai peur!*" He helped me up, and looking anxiously in my face, demanded: "*N'avez vous pas peur?*" The fear, however, was soon forgotten in further effort. Sometimes cheered by success, we congratulated ourselves upon reaching easier ground; but such ground often led us to the brink of precipices, which compelled us to retrace our steps, and to seek escape in some other direction. Thus was our progress, as I suppose all progress is, a mixture of success and defeat. What matter, if in

the final summing up of things, the ending be success? It was so in our case. The difficulties lessened by degrees, and we began to gladden ourselves by mutual expressions of "content" with what we had accomplished. We reached the base of the séracs; ordinary crevasses were trivial in comparison with those from which we had escaped, so we hastened along the glacier, without halting, to the Tacul.

Here a paltry piece of treacherous snow caused me more damage than all the dangers of the day. I was passing a rock, the snow beside it seemed firm, and I placed my baton upon it, leaning trustfully upon the staff. Through the warmth of the rock, or some other cause, the mass had been rendered hollow underneath; it yielded, I fell forward, and although a cat-like capacity of helping myself in such cases saved me from serious hurt, it did not prevent my knee from being urged with all my weight against an edge of granite. I rested for half an hour in our grotto at the Tacul, and afterwards struggled lamely along the Mer de Glace home to the Montanvert. Bloodshot eyes, burnt cheeks, and blistered lips were the result of the journey, but these soon disappeared, and fresh strength was gained for future action.

The above account was written on the day following the ascent, and while all its incidents were fresh in my memory. Last September, guided by the tracks of previous travellers, I ascended nearly to the summit of the icefall along its eastern side, and to those acquainted only with such dangers as I then experienced the account which I have just given must appear exaggerated. I can only say that the track which I pursued in 1858 bore no resemblance in point of difficulty to that which I followed in 1857. The reason

probably is, that in my first expedition neither myself nor my companion knew anything of the route, and we were totally destitute of the adjuncts which guides commonly use in crossing the "Grand Col."

JOHN TYNDALL.

NOTE BY THE EDITOR.

Few Alpine travellers can, or ought, to attempt without assistance to follow Professor Tyndall in excursions which demand all his skill and familiarity with the ice-world, but an experienced cragsman will find no difficulty in fine weather in ascending alone from Courmayeur to the summit of the Col du Géant. The way lies throughout upon the buttress which rises from the Mont Fréty to the snowy ridge west of the Aiguille du Géant. Preliminary examination of the rocks with a glass will save time which might be lost in searching for a passage at the point where the steep portion of the ascent begins. An exorbitant demand of forty francs for two guides suggested to me the idea of going alone, with no other preparation than a piece of bread and two hard eggs in my pocket. The excursion occupied just twelve hours between breakfast and dinner, of which one was spent in intense enjoyment of the scene from the summit; rarely can solitude in the Alps be enjoyed in such a position. It is not advisable for a lone traveller to descend more than a very short way on the Chamouni side, as there is a wide crevasse over which the snow covering is sometimes insecure.

The accompanying plate, representing Mont Blanc as seen from the Jardin, gives a full front view of the lower part of the ice cascade of the Glacier du Géant. To those somewhat familiar with such scenes it may convey some idea of

the difficulties and dangers which Professor Tyndall encountered, in ascending without the customary facilities afforded by a ladder and rope. It is impossible to indicate his track with any accuracy. The glacier itself undergoes great changes during each season, and after a few weeks it is often impossible for a traveller to recognise the scenes which he had fixed in his recollection.

CHAP. III.

NOTES OF EXCURSIONS ON THE WEST SIDE OF MONT BLANC, INCLUDING THE COL DE MIAGE.

BEFORE the well-known expedition of Messrs. Hudson and Kennedy's party in 1855, few travellers since Saussure had explored the north-west and west side of Mont Blanc. Besides the Aiguille du Gouté and Dome du Gouté, this includes three great aiguilles, those of Bionassay, Miage (north side), and Trelatête, with three glaciers bearing the same names, a smaller glacier, the Fraisse, several cols or passes over the chain, and a wide extent of snow-region lying round the dome of Mont Blanc from the Chamouni route westward to the Col de Miage. The following notes relate to explorations undertaken in 1856, which had for their principal objects, in the first place, the completing of the St. Gervais route as an independent one, by effecting the passage of the *arête* of the Bosse du Dromadaire, which unites the summit of Mont Blanc with the Dome du Gouté, so as to avoid the necessity of descending from this last to the Grand Plateau and following thence the Chamouni route: and in the next place, the discovery of a new route to the summit from the Col de Miage, which our party were, so far as I am aware, the first travellers who ascended. The Sardinian government map is very inaccurate and vague in delineating this side of the Mont Blanc region, and we found it almost useless for

ascertaining the relative bearings of points: from the excessive shading it is scarcely possible to distinguish the limits of the glaciers from the unshaded sides of hills; and the map seems intended to resemble a very imperfect raised model.

Mr. Coleman, in his work just published, "Scenes from the Snow Fields," gives an account of several expeditions in 1858. He *crossed* for the first time the Col de Miage from Courmayeur, and ascended the Aiguille de Miage. In other respects his plans, like ours, seem to have failed from bad weather, which has been singularly attendant on attempts from this side; and although one or two ascents have been made from St. Gervais, in the Hudson and Kennedy track, by descending to the Grand Plateau, up to this time (March, 1859) nothing more, as I believe, has been effected. The Bosse du Dromadaire, far from being surmounted, has never even been reached, and it is still wholly uncertain what is between the Col de Miage and the summit of Mont Blanc. These explorations require the calmest and most settled weather; the snow fields to be traversed are upwards of 12,000 feet in height, and a wind or mist which would matter little lower down is fatal to success on those exposed western ridges. The Dome du Gouté seems to be peculiarly subject to fogs in otherwise fine weather.

Our party, which consisted of Rev. J. Ll. Davies; H. W. Watson, Esq.; Rev. F. J. A. Hort, and myself (another friend who joined us being obliged to leave before weather permitted us to start), met at the Hôtel du Mont Joli, just above St. Gervais, before the middle of August, 1856, and there found very comfortable quarters. Those of the "chasseurs" of St. Gervais with whom we were acquainted,

were the following: Octenier, Mollard, Cuidet, Hoste, and the two Jacquets. Of Mollard, however, who is probably the best, we saw but little, as he was engaged on a hunting party in the valleys on the Piedmontese side. We found these chasseurs well acquainted with their own neighbourhood, active and expert in the rock and *couloir* work of aiguille climbing, and very cheerful and obliging; but we did not think them equal in general skill or determination to the best class of guides. Mollard and Cuidet would be as good a pair as could be selected. Octenier is rather superior to the rest in social position, having some property and a very neat cottage at Bionassay.

The weather, which had been magnificent up to the 12th of August, unfortunately changed; west and south-west winds set in, and for the next month there were scarcely two fine days together. While waiting for two of the party, who had been ascending the Jungfrau, Davies, Watson, and I resolved, as a preliminary expedition, to attempt the Aiguille du Gouté, and push on from thence as far as we could towards the top, in order if possible to survey the Bosse du Dromadaire for a future occasion. The weather was tolerably clear, but windy; we were not, however, then aware of the effects of a high wind on the aiguille. We took with us Hoste and another man, an ancien chasseur, who now kept a small auberge near the Hotel du Mont Joli. By some oversight we had no rope.

It had been blowing a gale of wind all night at the Col de Voza, and the wooden half of the Pavillon, whither we had moved our quarters, seemed on the point of being carried away. The Col de Voza, at the height of 5529 English feet, forms a very convenient starting point, and from thence to the *cabane* of M. Guichard at the foot of the

aiguille, a height of nearly 10,000 feet, is about four hours' walk, and presents no great difficulties if the way be known. The height of the Aiguille du Gouté is given at 13,000, and the Dome du Gouté 14,000, or more. We left the Col at about 8 A.M. on the 14th, and turning southward followed a faintly marked path leading along steep grass slopes with a gradual ascent, as far as a ravine where Mont Lacha begins. Ascending, and turning a little to the right on the opposite side of the ravine, a path, whose existence would never be suspected from above or below, traverses the precipitous side of Mont Lacha, on the Bionassay side, at a great height above the glacier. This leads out into a barren rocky region, which is crossed in nearly the same direction, till the right bank of the glacier is finally reached just above the part whence it begins to be much crevassed. The glacier is then traversed, turning sharply to the left after the first ridge of rocks is passed, and keeping up the slopes or along the rocks, so as ultimately to reach a spot at some height above the right or north-eastern bank of the glacier, near to its origin, and immediately under the Aiguille du Gouté. Here is the ruined *cabane* of M. Guichard, with a striking view of the Aiguille de Bionassay on the opposite side of the glacier, and from this point begins the ascent of the actual Aiguille du Gouté.

The west face of the aiguille, which is the only accessible one, is composed, like the Col de Miage and the upper part of the Finsteraar Horn, of a number of very steep parallel vertical ridges, each ridge being in fact a series of jagged rocks rising one above the other, sometimes alternating with short snow slopes, and the intervals between the ridges being filled with ice or hard snow, thus forming

couloirs, or shoots, which run from top to bottom of the aiguille. The ascent is made by following one of these *arêtes*, or ridges; but as the rocks are sometimes overhanging, especially near the top of the aiguille, it is necessary to cross from one ridge to another over the nearly vertical *couloirs*, which requires caution. The difficulty of this sort of ascent varies extremely with the amount of snow. If there is little snow the rocks are comparatively easy, but the *couloirs* are bare ice, and more difficult. On the other hand, a coating of snow makes it easier to cross the *couloirs*, but the rocks are then concealed and slippery. We were on the aiguille three times in the course of our expeditions, but never found it in the same state. Conspicuous on the aiguille there is one which has acquired the name of the great *couloir*, which, from the *cabane* below, may be seen on the face of the aiguille at some distance to the right. The usual course is to ascend a little way up the *arête* to the left of this *couloir* (which may be called *arête* No. 1), then to cross the *couloir* where it is broadest, and just above where it slopes more steeply out of sight towards the glacier below, and then to ascend the *arête* to the right of the *couloir* (*arête* No. 2), which can be followed to the top. On this occasion, however, the wind was exceedingly high, and on nearing the *couloir* we could see stones and rocks bounding down it; we, therefore, kept to the left along *arête* No. 1, and ascended by it the greater part of the way, till the rocks became overhanging. We then had to cross the *couloir*, which was here much narrower, and divided into several streams; it was nearly bare ice, no snow having lately fallen. At this height the falling stones were fewer, and had less momentum; unfortunately a small one struck Hoste on the arm, disabling

him, and we thought the arm was broken. A moment after, a serious slip sent one of the party actually off on the *couloir*, but he was brought up after a yard or two by a projecting stone. We felt much the want of a rope throughout the day. At last we reached the top of the aiguille, but it was plainly impossible to proceed further; the force of the wind on this exposed and outlying promontory was immense, and the snow seemed to be driven into little round balls like hail, so that we could scarcely stand on it, and one of us was caught by the hair in the act of slipping over the precipice. We could see the Grands Mulets far below us to leeward; but not wishing to be swept over towards them, after a few minutes we retreated, and descended *arête* No. 2, till we came to the usual passage of the great *couloir*. The scene here was one of the most exciting possible. The *couloir* was, perhaps, from fifty to seventy steps across, at an inclination varying from 40° to 50°; the whole of this space, together with the adjoining parts of the *arête*, was swept by a shower of fragments of rock of all sizes, which came whizzing and bounding down the slope, not continuously, or we should never have got over, but in volleys, the larger blocks breaking up and scattering in all directions as they fell. These stones are almost the only real danger which it is impossible to guard against; but I never witnessed a similar cannonade to the one we endured on this occasion. The wind and noise were deafening: from time to time a huge block would come flying, apparently over the top of the aiguille, dispersing us for several minutes in utter confusion. It was necessary to cross, however; so our friend the *ancien chasseur*, with great pluck went first and cut the steps, taking advantage of

lulls in the enemy's fire; and one by one the rest of us left cover and got over. The stones could be seen coming round a corner some distance overhead, and, on their appearance, a shout was raised to warn the individual crossing, who, however, could only stand still, for whilst putting one's feet with precaution into the steps, it was impossible to "dodge," there being an equal risk of being hit, and of losing one's balance, and so being hurled, in company with the other missiles, over the precipice. We gained the other side, however, in safety. Hoste's arm fortunately proved not to be broken, and though we had all had some narrow escapes, the adventure was an interesting one.

For some days after this rain fell constantly, and the barometer at the Hôtel du Mont Joli refused to rise in spite of continual tapping. In the mean time we made an excursion, with Mollard, to the upper part of the glacier of Trelatête, which is the largest and finest in this part. We left the Nantbourant road a little beyond Contamines, and crossing the hills, struck the glacier not far above its north-western angle. We descended a cliff on to the glacier, and traversed it without difficulty; it is here wide, level, and easily crossed, and stretches up for a great distance with no steep ascent, while at the head of it we could see a col, to the right of which a pass exists into the Allée Blanche, though I do not know of any traveller who has crossed it. We returned by the left bank of the glacier, and descended the rocks into the gorge of Nantbourant.

On the 25th of August the weather appeared to be clearing, and we determined to attempt the ascent of Mont Blanc by the Col de Miage (separating the north and south glaciers of that name), a route completely un-

known. The valley of Miage comes out at a high level a little below Contamines, whence its existence would scarcely be suspected; but it is a large and desolate valley, the glacier having apparently retreated a long way, leaving a rocky bottom cut up by torrents. We were told that no traveller had been at the head of the glacier, but there was a report that three *paysans* had lately been half way up the col, and they reported it to be tolerably bare of snow and accessible. This, however, was before the late rains, and much snow had since fallen. No one knew what intervened between the col and the summit of Mont Blanc, except that an *arête* led up somewhere behind the Aiguille de Bionassay, which must communicate either with the Dome du Gouté, or the Bosse du Dromadaire. The Col de Miage itself was probably higher than the Col du Géant, and we were prepared to spend a second night, if possible, somewhere upon it, but all must depend on the clearness of the weather. We left St. Gervais at 4 P.M., on the 25th, and passing through Bionassay, turned up the shoulder which separates the Bionassay and Miage valleys, through the picturesque mountain village of Champel, to the châlet de la Turche, on the north side of the Miage valley, high above the glacier, belonging to one of the Jacquets, where we passed the night on hay. At 3 A.M. the next morning we started, keeping as much as possible to the left, skirting the Col de Tricot, by which there is a passage from the Miage to the lower part of the Bionassay glacier, and thence to the Col de Voza. We pushed on along the side of the ridge, till at six we reached the Glacier de Miage at a point considerably above the first snow slopes leading down to the glacier on our right. Octenier, who led the party, now took a circuitous and fatiguing route as high up as might be, over alternate rock and snow slopes, till we

reached the bottom of the col without having touched the glacier, which now lay below us. It would have been shorter as well as easier to have kept lower down and followed the moraine of the glacier; but we found the object was to avoid a *bergschrund* lying between the glacier and the bottom of the col, which we thus circumvented. It appears that a fatal accident happened, many years ago, at this *bergschrund*, to a party of chasseurs who crossed the col from the Courmayeur side; but it was of no unusual dimensions, and passable by means of an excellent snow bridge, which we crossed in returning. If this snow bridge exists, as it probably does in most years, much time may be saved, and the course we took of skirting the rocks will be unnecessary. The ascent of the Col de Miage we found very similar to that of the Aiguille du Goûté, perhaps steeper, and the hard snow slopes were laborious enough to climb. We avoided the necessity of being roped, by all of us carrying "piolets" borrowed from the chasseurs, something between axes and pickaxes, which, however, were much too heavy and clumsy. In toiling up a stiff incline, one of the party caused some alarm to those behind, by being seen to bury his "piolet," while struggling for a footing, deep in the ankle, as it seemed, of the man in front of him; an exceedingly thick gaiter and boot proved to have averted the calamity, which would have been a serious one at this height. A model form of weapon, something between a hache and alpenstock, for these excursions has yet to be invented. For soft snow descents, and for rock, a hache is generally too short or too heavy; on the other hand a mere baton is useless upon hard ice, and makes it often necessary to use the rope, which otherwise might be reserved, as it ought to be, for traversing snow fields where there is danger

of concealed crevasses. The right length would be about five feet, the head not too heavy, and the slightly curved end not more than six inches.

We were now approaching the summit of the col, which was plainly visible, with no difficulty intervening; and we began to see a long *aréte* stretching up to the left towards the Dome du Gouté, steep, but to all appearance not impracticable. But at this point a snow storm suddenly came on, destroying at once all hope of being able to proceed. We halted, about 10 A.M., a few minutes below the col, and deliberated whether we should attempt to descend to Courmayeur; but it seemed likely that the Italian side would be more difficult than the one we were on, and the ground was unknown. We therefore determined to secure our retreat. We reached the bottom of the Col about twelve, crossed the *bergschrund* by the bridge, and descended the glacier for some distance; we then took to the moraine on the right, and finally to the hills. On arriving at the châlets of Miage at 4.20 P.M., Octenier to our amusement, proposed to go on and order the *musique du pays*, which it appeared was in readiness to celebrate our return in triumph from Mont Blanc; but under the circumstances, we declined the *musique du pays*.

On the 28th of August three of the party, Watson having left us, started again: this time we proposed to take the route over the Dome du Gouté, and attempt the passage of the Bosse du Dromadaire. We resolved to sleep at the *cabane* at the foot of the Aiguille, and arrived there at half past eight in the evening. The *cabane* consists of two walls of stone, under the lee of a rock; there was an attempt at a roof, but it fell in on being touched, and the interior was completely choked with ice and snow. After

the process of clearing was accomplished, we spread our blankets, and though without any covering overhead, being protected against the wind by the rock, we found no inconvenience from cold in the night, nor, indeed, from anything, but being packed too tightly. Of the four requisites for a couch—dryness, warmth, moderate softness, and freedom of motion, the two first are more generally attained than the last in these sleeping-places; yet it is difficult to sleep without the power of moving one's limbs. Nothing is in all respects so convenient as a regular sleeping-bag, waterproof outside, thick or double blanket inside. If waterproof is not at hand, calico dipped in oil and bees-wax, and thoroughly dried, is a very efficient substitute. One porter could easily carry the sleeping-bags of a whole party, and by means of them I believe it will be found possible to pass the night at much greater elevations than is commonly supposed, and thus to gain summits which, like some of the Chamouni aiguilles, are inaccessible after the very early morning.

By five next morning we had left the *cabane,* and climbing pretty fast, reached the top of the aiguille at 7.20. About nine we were on the immense snow-fields of the Dome du Gouté, passing one or two singular ice-cliffs, and saw now beneath us the unascended Aiguille de Bionassay, connected with the ridge of the Bosse du Dromadaire by a steep but seemingly not impassable *aréte.* We intended, if successful, to attempt this aiguille on our return, and Octenier carried a black flag to plant upon it. But with the ill-fortune that pursued us on these expeditions, no sooner were we on the Dome than an impenetrable mist and bitter wind came on, and we could not see twenty yards in any direction. The top of the Dome

du Gouté is symmetrical on all sides, and we could make nothing of the direction; on one side were the precipices overhanging the Bionassay glacier, on the other, the part from which avalanches fall, near the Chamouni route, below the Grand Plateau; we made several efforts to descend, but to no purpose, and the compass was of no assistance, our maps being far too vague to give with certainty bearings of the top of Mont Blanc from the point where we were. After wandering for some time we endeavoured to bivouac and wait, but the cold was intense, our breath froze, and we found it impossible to stand still for any length of time. It became advisable to retrace our footsteps, as the snow was drifting, and about a quarter before eleven we turned back across the wastes of snow which separated us from the aiguille. The mist which had baffled us proved to be only local, and as we descended the aiguille the afternoon sun shone out fiercely. The failure was a somewhat mortifying one: Davies left us next morning, and the two who remained suffered considerably from inflammation of the eyes, as the result of the bitter wind on the Dome followed by hot sun: — a disagreeable incident of snow-travelling of which the only preventive is not to go to bed, but to remain in the open air till the symptoms have subsided. On the day we were laid up in this way took place the only ascent from Chamouni which was made during the time we were at St. Gervais.

The fourth attempt, made by Hort and myself, had a somewhat singular result. Arriving by chance on the 4th of September at the Col de Voza, we found an Englishman come over from Chamouni to attempt the St. Gervais route, with Octenier and a party of Chamouni guides, and Jean Couttet (au Lavanchy) for leader. The

barometer was again falling, but we were unwilling to lose a chance, and agreed to join the expedition. Next morning we took the well-known way towards the Aiguille du Gouté, intending this time, for the sake of being beforehand the following day, to pass the night somewhere among the rocks at the top of the aiguille, which are overhanging, and might offer some shelter among their recesses, though the days were getting shorter and the nights cold. There has since been a sort of cabin erected on the spot, which is painted by Mr. Coleman. It is, I suppose, considerably the highest ever built in Europe, and a more desolate and exposed situation cannot be conceived. While dining at the Guichard *cabane* on our way up, an imposing avalanche fell from the Aiguille de Bionassay, doubtless not so large as those of spring, but the finest I have seen. A huge black cloud rose and floated over the mass as it rolled slowly down the glacier, spreading out and filling up the crevasses in its course, till the impetus by degrees spent itself, and the debris settled into a mountain of snowballs. This was probably our last chance for the year, and we were not disposed to give in easily; but it was evident that our old enemy, the west wind, was rising. As we climbed the rocks, it became colder every minute, and the prospect of our resting-place seemed less and less inviting. The Chamouni men did not like the aiguille, nor to say the truth, with the exception of Jean Çouttet, did they acquit themselves brilliantly on it; we were loaded with wood and other materials, and advanced but slowly; however, about 6.20 P.M., we began to near the top. The sky had become stormy, and the wind drove into every nook and cranny of the rocks; the cold was excessive; and when we reached the summit it

was evident, that so far from sleeping, we could not stay there half an hour. Altogether, our position was becoming unpleasant: daylight was fast disappearing; the fields of snow beyond looked dreary in the extreme; and to crown all, one of our men, who was heavily loaded, fell down in the snow and appeared frost-bitten.

We held a hurried consultation: the Chamouni men declared, that without daylight it was impossible to descend by the way we had come, and Jean Couttet proposed that we should strive to push on over the Dome du Gouté and descend to the Plateau, with a view to gaining the Grands Mulets, where we should be in comparative safety. The thought of the Dome du Gouté on a stormy night was not the most delightful; but it was something gained to be kept in motion, and we had a small lantern. Accordingly, two of us threw up our caps and ran off in the direction of the Dome; the caravan followed, throwing away wood and superfluous baggage in the snow. But before we had gone many hundred yards, the same man again fell down, and we were brought to a stand-still. It was the habit of Octenier to put on a nightcap over his other head gear in seasons of difficulty; he now assumed this, and proceeded to scream, gesticulate, and insist on our returning to the aiguille: the face of Jean Couttet became portentously grave, and farther advance was given up. It was out of the question to leave any one behind, and the probability was, as Couttet afterwards admitted, that but few of us would have arrived that night at the Grands Mulets. We took in tow the disabled man, and being roped all together, prepared to get down as best we could.

The descent of the Aiguille du Gouté by night was a

somewhat novel operation. It became dark before we had got far down, and we groped cautiously along, handing the single lantern from one to another; now and then some one slipped with a crash, but was held up by the rope. Fortunately as we came lower it became warmer, and the cold, our most serious evil, ceased to be much felt. We arrived at length at the *couloir*, which was dark and silent; we felt our way into the steps, each man guiding the feet of his neighbour. I found some embarrassment from a heavy Chamouniard next me, who was not very successful in preserving his equilibrium; but on the whole we got surprisingly well over. It is always more easy than one would suppose to keep a particular track by night, though extremely hard to follow a general direction; the eye is not distracted by surrounding objects, and learns to discern the least shade of difference in the colour of the ground, while the contrast of rock and snow is perceptible, even in the darkest nights.

By about half-past ten we were across the *couloir*, and soon reached the *cabane*, where we stopped awhile for shelter, having escaped from our "fix" on the aiguille. The lantern suspended from a rock made a scene for Rembrandt: the various expressions of the group, the lengthened visage of Couttet, Octenier's nightcap, our weatherbeaten appearance and general hilarity. After a time we continued our way down the glacier, in an irregular manner and with little precaution. The dim forms of the party could just be distinguished glissading down the smooth upper slopes, or coming into unexpected collision at the bottom of an incline: in the distance the lantern-bearer pursued his course, showing a glimmering and wandering light, at times becoming a fixed star, to which we all re-

paired, as he paused on the brink of a large crevasse to light the party over. As the night wore on, we managed to strike the right point of the rocks from which Mont Lacha could be gained, and proceeded along the not very broad path in single file, those being fortunate who walked near the lantern: it rained heavily, and to maintain a light at all was sometimes difficult. At last, after passing Mont Lacha, and within three quarters of an hour from the Pavillon, we utterly lost our way. The whole party dispersed themselves, and groped upon the ground in all directions for a long time, but to no use: the grass slopes were too steep to cross without a path, and as a last resort our drenched and rather weary party mounted to the very top of the ridge, and scrambled along this till it fell towards the Col de Voza, where we ultimately found ourselves, after a night of adventures, at four in the morning of the 6th.

With this expedition closed our attempts for 1856 in this quarter: and they have not since been renewed, though one or two of the party hope to do so ere long. It is not that an easier or shorter route than that from Chamouni remains to be discovered: the Chamouni route is still the shortest in point of time, and has the great advantage that it can be undertaken in almost any weather. All other routes must traverse long and exposed ridges, and the Bosse du Dromadaire, if practicable at all, will certainly not be so in a high wind; while the necessity of reascending the Dome du Goute in returning, is a serious objection to the St. Gervais route as at present taken. But there is no reason why there should not be a variety of routes, and particularly one that can be taken from the Italian side. The route from the Col du Géant, if it be ever completed, will have the disadvantage of the immense

circuit necessary to round the Mont Blanc du Tacul. Until the *arête* above the Col de Miage has been tried, there is a fair prospect that it may offer a tolerably direct as well as practicable way: it will probably be necessary to pass a night on or near the top of the col, but this may be done quite as easily as on the Aiguille du Goûté. The problem, therefore, which awaits the explorer of this region is—given the feasibility of ascending the south glacier of Miage—to find a passage in two days from Courmayeur to Chamouni over the summit of Mont Blanc.

F. VAUGHAN HAWKINS.

NOTE BY THE EDITOR.

In September 1853 I had an unusually favorable distant view of the portion of Mont Blanc lying between the Col de Miage and the summit, or at least of that portion that is visible from the south side.

The woodcut here given is taken from a sketch made on the top of the Croix de Feuillette, a point about 8000 English feet in height, a few miles west of the Col du Clou. It is eighteen miles distant, as the crow flies, from the summit of Mont Blanc, and due south from the Mont Blanc du Tacul, which is seen to the right. It would appear that if the rocky point immediately to the east of the Col de Miage be once attained, there should be no serious difficulty in following the ridge that extends from thence to the north-east; whether or not that ridge is connected with the Bosse du Dromadaire by practicable slopes, behind the tremendous precipices that fall away from near the summit towards the south-west, is the first point that remains to be decided by those bold mountaineers who may explore this route—the next will be to ascertain whether the highest peak can be reached from the Bosse du Dromadaire.

I ought to say that after making the sketch which is here copied, it seemed to me that I had, though very slightly, exaggerated the steepness of the slopes on either side of the

DISTANT VIEW OF THE CHAIN OF MONT BLANC, FROM THE CROIX DE FEUILLETTE.

central mass of Mont Blanc. It is, however, certain that from the distance at which my sketch is taken, the great superiority of the peak of Mont Blanc over his attendant aiguilles is far more apparent than from a nearer station, as may be seen by referring to plate v. vol. ii. of Saussure's Travels. The mountain on the extreme left in the woodcut is the Aiguille de Miage, first ascended by Mr. Coleman in 1858. I find it difficult to make his description of what he saw of the *arête* leading from the Col de Miage to the Bosse du Dromadaire harmonise with what I saw from a distance; but daily experience in the Alps shows how differently great mountains present themselves according to the point from which they are viewed.

CHAP. IV.

THE MOUNTAINS OF BAGNES, WITH THE ASCENTS OF THE VÉLAN, COMBIN, AND GRAFFENEIRE, AND THE PASSAGE OF THE COL DU MONT ROUGE.

Excursion of 1854.—*The Vélan.*

THERE are very few parts of Switzerland which more richly reward the lovers of Alpine scenery, and which have been hitherto so utterly neglected, as the magnificent mountain ranges which enclose the savage defile of the Val de Bagnes. Six great glaciers pour their frozen streams into this valley, one of them famous as the cause of the melancholy inundation of 1818, and from the chain of the Combin, which forms its western barrier, and occupies the triangular space between the two branches of the Dranse, rises a great alp, a hundred feet higher than the Finsteraarhorn. Yet, not one in every hundred of the crowds of tourists, who flock every year to the St. Bernard Hospice, turns aside at Sembranchier into the Val de Bagnes, and of these, scarcely any one has explored the snow basin of Corbassière, or wandered over the ice fields of Chermontane; while those writers who have made the passage of the Col de Fenêtre, have invariably described the "inaccessible precipices of the Combin," with the sort of hopeless feeling with which they might have spoken of the mountains of Sikkim or Nepaul.

It was in the year 1854 that I first became acquainted

MOUNTAINS and GLACIERS of BAGNES.

Mr Matthews's route
Rhone
Riddes
Isérables
Col des Etablons ou de Verbier
Verbier
Valette
Cheables
Mont Fort
Pic de Vonasson
Hauderes
Combe d'Arolla
Le Levron
Grange
Pic de Sery
Mt Pleureur
Pas de Chermontane
Col de Otemma
Gl. d'Otemma
Gl. d'Arolla
Pas de Cleuson
Gl. de Cleuson
Pas de Boveyre
Gl. de Boveyre
Pas de Severine
Gl. de Severine
Pas de Cheuson
Gl. de Cheuson
Pas de Breney
Gl. de Breney
Pas de Crevasse
Gl. de Crevasse
Pas de Chermontane
Gl. de Chermontane
Gl. de Tsena
Mont Gelé
Gl. de Cleuson
Gl. de Mont Durand
Mt Avril
Mille
Gl. de Chermontane
Gl. de Fenetre
Mt Velan
Chalets et Hy
G. St Bernard Hospice
Grand Combin
Combin de Corbassière
Gl. de Corbassière
Gl. de Tseudet
Gl. de Giétroz
Gl. de Mont Durand
Gl. de Fenetre
Gl. de Valsorey

with this interesting district. I was travelling in company with my friend Mr. W. L. Cabell, and one sultry August morning we were toiling along the road which leads from Martigny to the Great St. Bernard. Our guide, or rather porter, was one Gaspard Tissier of Martigny, a man who united a very serious impediment in his speech to that pure French pronunciation for which the Valaisans are so justly celebrated. As we were deploring the dreary monotony of the route, the snowy dome of the Vélan burst suddenly into sight, and shone gloriously in the sunlight at the head of the valley. The desire to ascend it occurred at once to each of us, but Gaspard asserted that it was altogether inaccessible, and scoffed at the idea of any one making so hopeless an attempt. We were, however, so charmed with the appearance of the mountain, that after our arrival at the hospice, we had a long talk in the evening with some of the monks upon the subject. They told us that the ascent was a matter of no great difficulty, that no tourist had made it for many years, but that two chasseurs had been upon the summit a week or two before, and spoke enthusiastically of the extent and magnificence of the view. They strongly urged us to undertake the expedition. We came to no determination that evening, for the weather seemed uncertain; we were as yet unacquainted with the great ice world, and had never experienced that feeling of intense longing which seizes every Alpine traveller in the presence of a noble mountain.

The next morning gave promise of one of those peculiarly bright days that sometimes intervene between periods of bad or doubtful weather. We got up soon after four, looked out of our window, and immediately resolved to

devote the day to the exploration of the Vélan, but a preliminary difficulty presented itself; mass began at five and lasted until half-past six, and until it was over nothing in the shape of breakfast was to be had. Being unacquainted with the commissariat resources of the route, we did not consider it wise to start on empty stomachs, and it was not until seven o'clock on the morning of Thursday the 17th of August, that we left the hospice for "La Cantine de Prou," the little inn where the char road from Martigny comes to an end, and where, following the directions of the monks, we hoped to find our guides. By great good fortune the chasseur landlord, André Dorsaz, was at home; he expatiated on the folly of commencing a "grande course" at so ridiculously late an hour, and strongly urged us to put it off to the following morning; but we were inflexible; the splendour of the day was almost maddening; the idea of passing it in the confinement of the valley was insupportable, and we longed to get upon some eminence and breathe in full freedom the delicious air; we were resolved to start at any rate, turn back when necessary, and run the risk of not being able to reach the summit. We engaged Pierre Nicholas Moret as second guide, exchanged the miserable alpenstocks we had brought from the Oberland for more serviceable weapons, and provided ourselves with a rope, an ice-hatchet, and suitable supply of provisions. Some time was consumed by these preparations, and it was not until nine o'clock, when we ought to have been on the top of the Vélan, that our party, consisting of Dorsaz, Moret, Gaspard, and ourselves, quitted the Cantine.

We retraced our steps towards the hospice for a short distance, then bore away to the left and ascended the

grassy slopes which border the Plaine de Prou. A waste of rocky fragments had next to be crossed, and we then arrived at the Glacier de Prou, which being but slightly crevassed offered little hindrance to our progress; but we were soon brought to a stand by a great cleft or *bergschrund*, which ran all round the upper part of the glacier, and guarded the mountain like a moat. At last, Dorsaz discovered a tolerably firm snow bridge, which we crossed to the foot of one of the many rocky buttresses which descend from the Velan on this side. The rocks were firm but very steep, occasionally intercepted by slopes of frozen snow, requiring the use of the axe; these sometimes having an edge like a steep keel, which had to be climbed, one foot on one side and the other on the other. We worked away steadily for some time, and at last, at three o'clock, exactly six hours after we left the Cantine, we were standing upon the summit.

Great as were the expectations I had formed of the view from the Vélan, I confess I was totally unprepared for so magnificent a panorama. I have since traversed the High Alps in various directions, and ascended some of the loftiest summits, but I have never seen an Alpine view of such exquisite perfection. The effect it produced upon us was no doubt partly due to its being the first time we had enjoyed a really extensive mountain prospect, but much more to the extremely propitious atmospheric conditions under which we saw it. When a great elevation is reached in fine weather, the sky is generally of that intense black blue which is peculiar to the higher regions of the atmosphere, while masses of white clouds often hang upon the mountain sides, and seas of mist float over the glaciers, or come boiling up the valleys. Such a prospect has, indeed,

a charm of its own, but under these influences the mountains are frequently much obscured, and the glare of the sunlight on the nearest snow is almost blinding. Our view from the Vélan was seen under exactly opposite conditions. Far away above our heads a thin veil of grey mist was stretched over the sky, dimming the sun sufficiently to relieve the eye-sight, without destroying the light and shade. As far as the eye could reach in any direction there was not the smallest fleck of vapour to break the beautiful outlines of the Great Alps.

We were, of course, far above the long subalpine ridge which divides the Val d'Entremont from the Val Ferret. We could consequently see the whole range of Mont Blanc stretching in unapproached majesty from the Col de la Seigne to the Mont Catogne, with the snowy summit of the mountain itself, the wonderful obelisk of the Géant, and the great glaciers which fall into the Allée Blanche. Southward were the many untrodden summits of the Graian Alps, and a little to the right, in the dim distance, the far away peaks of Dauphiné. In the opposite direction could be traced the course of the Val d'Entremont, then the Rhone Valley below Martigny, terminated by the blue waters of the Lake of Geneva, and, further still, the long lines of Jura fading away gradually as they trended to the distant north. Not the least striking was the prospect eastward. We had reserved the Monte Rosa district for another year, but books and views had made us familiar with the forms of its principal peaks; and we now saw them face to face for the first time, and pointed them out to our guides, who knew the names of none of them. First were the glaciers of Breney and Chermontane, with the mountains which enclose them, then the Matterhorn,

fully as impressive as from any other point of view, and from its base extended to the right a great snowy mass, which we took for Monte Rosa, but which, on consulting the outline I sketched of it, I now believe to have been the southern face of the Breithorn and the Lyskamm. I have no note of the Alps of the Oberland, but some of them must certainly have been visible.

In one direction only was there any interruption of the panorama. A little to east of north, a snow peak nearly 2000 feet higher than our standing-place towered into the sky. Now there is nothing in the world so provoking to an Englishman who has climbed up a hill to get a view, as to find a summit of greater elevation just out of his reach. It struck us immediately that the view from this mountain would be more extensive than that from the Vélan in proportion to the greater height, and it would evidently be quite uninterrupted. The following conversation accordingly took place. "Dorsaz: what is that big mountain almost close to us?" "The Grand Combin, monsieur." "We must go up there at any cost." "That, monsieur, is quite impossible; many chasseurs have explored it, and they all say it is quite inaccessible." I was, however, very sceptical on this point, and resolved, if I ever should have the happiness of revisiting the Alps, that I would strain every nerve to plant my alpenstock upon its summit.

The height of the Vélan is 12,441 English feet*, and its summit consists of a rather extensive flattened dome of

* The heights of the principal mountains described in this paper are taken from Ziegler, "Sammlung absoluter Höhen der Schweiz," p. 131, where they are given on the authority of Berchtold and Müller. I have in each case converted the height in metres into English feet. I took a barometer on my second excursion, but it met the usual fate of this instrument, and was broken before I had any opportunity of using it.

snow; a circumstance greatly in its favour, as standing on a knife edge, holding on to an alpenstock thrust into the snow, is not, except with persons of very peculiar temperament, conducive to the enjoyment of fine scenery.

We remained on the top just long enough to outline the principal mountains, and then, as every moment was of importance, began to think about returning. Dorsaz judged our morning's route too steep to go down by, so we made a long detour, and descended on to the glacier of Valsorey. We passed by the singular lake called the *Goille à Vassu*, described by Saussure (*Voyages dans les Alpes*, ch. xlv.), full of water in the winter, which escapes under the ice in the summer. It was then quite dry. We had no time to examine it, and taking to the glacier again, pushed on as fast as possible, but it was nine o'clock before we reached our night's resting-place at the village of St. Pierre. The next morning we returned to the Hospice.

Without reckoning Gaspard's daily pay of five francs, our excursion had cost us exactly a pound apiece; ten francs for provisions, and a napoleon each for the guides; a moderate sum enough for a *grande course*. We were greatly pleased with our guides. I have seldom met with a man so active, courageous, and attentive as Dorsaz, and it was with the greatest regret that I heard, in 1857, that he had just before been carried off by fever.

The Vélan owes its excellence as a point of view to its comparatively isolated position, and to its central situation between the great masses of Mont Blanc and Monte Rosa. From nowhere else in Switzerland, excepting, perhaps, from the Cima di Jazi, can so fine a panorama be seen with so little expenditure of time and labour; and considering the crowds of tourists who daily pass close to it in

the summer season, it is very surprising that it is not oftener ascended.

Excursion of 1856. — *The Grand Combin and the Col du Mont Rouge.*

IN 1856 I visited Switzerland with my brother, Mr. C. E. Mathews. Our plan was to explore the Pennine Alps from Mont Blanc to Monte Rosa, ascending those two mountains, and zig-zaging along the intermediate chain. But the enterprise to which we looked forward with the greatest pleasure was the scaling of the Grand Combin, which we determined to effect if possible. As a modest introduction to the larger scheme, we were to commence our Alpine tour by an expedition which, with our friend M. Ph. de la Harpe of Lausanne, we had planned the preceding year, — the ascent of the Dent du Midi, — an excursion much less known than it deserves to be, and which I trust will ere long have full justice done to it by some member of the Alpine Club.

Early in the month of August, we hurried to Lausanne, and, joined by La Harpe, and a friend of his, Mr. John Taylor, proceeded to Monthey. We walked up the beautiful and luxuriant valley of Champéry to the village of the same name, and after resting a few minutes at the comfortable inn, went on to sleep at the châlets of Bonavaux, close to the base of the Dent. At a quarter before nine, on the morning of the 7th of August, we were seated on the extremity of the longest cusp of that great molar. Next to Mont Blanc, which is seen to surprising advantage from this point of view, the most conspicuous object was the Combin. A large telescope which Taylor had brought

with him was immediately called into requisition, and we examined with the greatest care the face of the mountain which was opposite to us. It was of no great inclination, and ice-coated from top to bottom, but covered with such a multitude of gigantic masses of snow, flung together in such wild confusion, that it was impossible to detect any practicable route among the labyrinth of precipices and crevasses. The ascent would evidently be a matter of no ordinary difficulty.

We descended from the Dent into the Pissevache valley, where our two friends left us to return to Lausanne, and we went on to Chamouni. Here we sought out Auguste Balmat, who as chief guide that year had been unable to accept our invitation to accompany us, but who had retained for us the services of Auguste Simond, who was one of Mr. Wills's guides in his ascent of the Wetterhorn. We had no reason to regret Balmat's selection: Simond soon endeared himself to us by his many admirable qualities; and it is to his zeal, energy, and courage, that we owe the success of many subsequent expeditions.

After having been beaten back by bad weather in an attempt to ascend Mont Blanc by the Aiguille de Gouté, we returned to Chamouni, and held council with Balmat upon the route we ought to take. He entered most heartily into our views: "Nothing," he said, "pleased him so much as 'les nouvelles ascensions;'" and an expedition to the Combin was of great interest, as it had long borne among the guides of Chamouni the reputation of being inaccessible. Our first idea had been to attack it from St. Pierre, and we proposed going thither by the Col du Géant, which we had a particular desire to cross. We found, however, that owing partly to the *règlements*, and

partly to our having to pay double the market price for the necessary provisions, the passage of the Géant could not be effected by two persons at a less cost than 10*l.*, — a sum preposterously disproportionate to the difficulty of the excursion, — and that any attempt to cross the pass in a rational manner would entail fine and perhaps imprisonment upon Simond. While we were debating this point, whom should we see among a cluster of guides standing around the door of the chef's bureau, but Gaspard Tissier of Martigny. He told us that the year before, a chasseur of Bagnes had succeeded in reaching the top of the Combin, — a statement which turned out to be untrue, but which determined us to abandon the Géant and hasten at once into the Val de Bagnes. An hour or two after, we quitted Chamouni; and it was not without heartfelt pleasure that I turned my back upon that den of thieves.

We took the route by the Tête Noire, slept at La Berberine, and crossed the Forclaz the following morning. When about an hour from Martigny we rearranged our knapsacks, and retaining only a few things of absolute necessity, made the rest into a packet which we sent by Simond to Martigny, to be forwarded by post to Zermatt. We took a track to the right, and in a few minutes struck into the Val d'Entremont, just below Bouvernier. At mid-day we reached Chables, the chief town of the Val de Bagnes, whose church spire, massive stone bridge over the Dranse, and quiet cluster of houses and châlets, looked picturesque enough. We hastened to the inn which, fortunately for us, had just been built; the quarters were rough, certainly, but everything was good of its kind, the charges very moderate, and the landlord, M. Pierre Perrodin, extremely attentive and obliging. Throughout

the ten leagues from Sembranchier to Valpeline along this route, there is no other place of entertainment for man or beast.

We were informed, much to our surprise, that the Grand Combin was quite a feasible undertaking, but that it had only been ascended once, seventeen years before, when a gentleman from Berne reached the summit, accompanied by Benjamin Felley, a chasseur of Lourtier. The route lay along the glacier of Corbassière, and the excursion would take three days, it being necessary to sleep two nights in the châlets by the glacier side. One François Louis Felley, a superintendent of the workmen who are constantly engaged in cutting away the dangerous glacier of Gétroz, happened to be at the inn, and we gladly availed ourselves of his offer to go up to Lourtier, and bring his kinsman down that evening. The Felleys appeared to be very numerous in the Val de Bagnes, and Forbes's guide, whose name he writes Feilay, was doubtless one of the same clan. The morning had been magnificently fine, but in the afternoon we had the disappointment of seeing the sky covered by dull grey clouds. As we made a rule of never delaying excursions for merely threatening weather, we arranged that the following day (Sunday) we would walk quietly up to the châlets of Corbassière, distant about four hours, and that we would attack the Combin on the Monday morning. It was not long before Benjamin Felley arrived, a short, thin-faced, light-haired man, between fifty and sixty. We deputed Simond to settle the terms, and he engaged Benjamin as guide, and François Louis as porter, the former at six and the latter at five francs a day. Our next step was to settle the commissariat for the three days' march. We took six loaves of bread, a quantity of

excellent cold chamois, a piece of cheese, chocolate, sugar, and ten bottles of sour white wine. Wine is always a heavy and troublesome thing to carry, but it is not easy to dispense with it, and I have always found a mixture of wine, snow, and sugar a very refreshing beverage at great altitudes. Simond was greatly dissatisfied that there was no vin rouge; "Le vin blanc," said he, "coupe toujours les jambes," — a result which happily we did not experience. Our provisions cost us less than twenty francs. I subjoin the actual bill for the especial edification of the *habitués* of Chamouni; it is also interesting as a specimen of the orthography of the Val de Bagnes: —

Duvin boutelle 10	400
Vyende	600
Fromaje	140
Dupin	480
Chandele	30
Odevyeserise	30
Sucre	240
Chocola	60
	1980

Soon after six in the morning of Sunday, the 17th of August, our party of five quitted the little town by the narrow mule-track which leads up the Val de Bagnes. Crowds of people, all dressed in their best, were coming down the valley to mass, and we had no idea that it contained so large a population. Both men and women had an honest independent appearance, they were well-formed, and not ill-looking, and were free from those hideous deformities which are the curse of so many valleys in the Alps. Felley was stopped by many of the groups of villagers, questioned as to his destination, and hopes expressed that we might get safe back again. An hour's

walk brought us to Lourtier, a cluster of poor châlets, where we stayed a short time, while Felley went home to get a hatchet and to bid farewell to his family. We were well provided with rope, having brought 100 feet of good sash cord from England.

Above Lourtier the Dranse thunders through a narrow gorge, by the side of which the track rises rapidly, and we had beautiful views of the Dent du Midi, and of a fine snow peak up the valley in the opposite direction. A little further on are the châlets of Granges Neuves, opposite to which the Corbassière torrent joins the Dranse, and further still, those of Plan Praz, where we left the main track and crossed the river by a foot bridge to the base of the Becca de Corbassière. Then commenced a steep climb up slopes of mingled crag and greensward, clothed with thick bushes of the mountain alder, and gay with green clusters of elegant ferns, and the beautiful blue flowers of the Alpine sow-thistle. Within a circuit of a few yards I counted eleven species of ferns, and the following year, at the same place, found a twelfth, gathering the finest specimens of *Woodsia ilvensis* that I have ever seen. The weather had been threatening the whole morning, and so violent a storm of sleet and hail now burst upon us, that we were glad to crouch for shelter under the alder bushes, and it was more than an hour before we could resume our journey. We soon reached the châlets of Corbassière, on the comparatively level pastures on the eastern side of the glacier, and were rewarded by an Alpine view of more than usual magnificence.

Opposite to us rose a noble range of mountains, separated from our standing-place by the long and narrow ice-stream of Corbassière. The northern end, which rested on

the Val de Bagnes, was protected by the massive outworks of the Becca de Séry; next to this were the curious rocky pinnacles of les Avoulons and les Follats, then followed a lofty dome of snow, and the chain was terminated on the south by a still higher mountain, crowned by a glittering snow peak of exquisite beauty. "Those," said Felley, "are the Petit and the Grand Combin." Far away up the glacier, half veiled in murky clouds, loomed another snowy mass, of which more presently. A little below the Petit Combin the glacier bed is very steep, and forms a sort of cliff. The glacier has retreated from the eastern side of this declivity, leaving it bare and polished, and plunges down the other, or western side, in an icy cataract.

The principal châlet was a stone hovel of about twelve feet by ten, two feet high at the sides, and eight feet in the centre, with a roof of rude stones through which the rain oozed in a hundred dripping streamlets; the only furniture, a copper boiler, a copper kettle, a churn, a few milk pails and wooden cups, and two one-legged milking stools. A wood fire was burning inside, the smoke of which had filled the hovel, and was vainly struggling to get out at the door, and a miserable grisly cowherd was standing by it, making cheese in the copper cauldron. Outside the ground was sodden with wet, and trampled and defiled by cattle. It was impossible not to feel saddened by the only painful thought incident to Alpine travel, that in the midst of the greatest glories of nature, the life of man should be so wretched.

We found in the châlet two young men from Chables, who had heard of our project, and had attempted by starting very early to get on the Combin the first day, and deprive us of the legitimate honour of the ascent. They had got some way up the mountain, when the storm came

on, and drove them back to the châlet with signal discomfiture, and when we saw them they were drenched from head to foot, and looked the very picture of misery and despair. Of course, we told them how greatly we regretted that the unpropitious weather had prevented the fulfilment of their amiable intentions, and how much we should be gratified if they would favour us with their company on the following morning. It appeared that Sunday was the only day on which they could make an excursion, and they hastened down to Chables almost immediately.

The rain having somewhat abated, we went to explore the glacier, the main features of which I shall now describe, to save recurring to the subject, although the examination was not completed until the next morning. Originating in an elevated snow basin of great dimensions, it pours its ice stream down the long and narrow channel which lies between the range of Combin and the parallel rocky ridge of Corbassière, which separates it from the Val de Bagnes. The narrow portion is about five miles in length, and divided into an upper and a lower level by the cliff described above. There is no medial moraine, but a belt of large blocks edges the glacier on the Combin side. As we stood by the châlets we were surprised to see no corresponding moraine on the nearer side; but the ice for a considerable distance appeared strangely discoloured. This was the more curious, as where the ice came down the cliff, the Corbassière moraine appeared in its proper position. The cause of this was soon explained. Some little distance along the upper level there is a great ice cave in the glacier side, the stream issuing from it dashes down the cliff, and re-enters the glacier by another cave below; the whole moraine is engulfed at the same place, and the

blackening of the glacier is the result of its efforts to digest its stony meal. On the Corbassière side of the upper level, there are two ancient moraines running for a long distance parallel to the modern one; the outer one of these is all grassed over, but broken through in many places by recent rock falls from the cliffs above. Several of the Swiss glaciers have peculiar tints, depending upon the nature of the rocks which are thrown down upon them. The Zmutt glacier, for example, has long been noted for its red colour. The glacier of Corbassière, though in a less degree than that of Fenêtre, has a general green appearance, caused by the numerous fragments of serpentine strewn upon its surface.

After a hearty meal of hot chocolate and bread and butter, we discussed the arrangements for the night. Sleeping in the châlet was out of the question; but just beyond it was a large block whose under surface projected some distance over the ground without actually touching it, and thus formed a hole some six feet square by about two high. The herdsmen used it as a sleeping place: they had built a wall at a little distance in front, to keep out the wind, and covered the bottom with hay; they kindly gave it up to us, and we found it a very comfortable dormitory. We lay down and listened to the pleasant rushing of the torrent, and I, who was outside, could just see the pale peak of Combin shining among the solemn stars.

At half-past three we were aroused by Simond: "Il fait très-mauvais temps, messieurs," said he; "on ne peut partir." At this cheering announcement my brother started up, and brought his head into such violent collision with the stony roof of our chamber, that I feared he would have been disabled for the day. It was indeed a gloomy outlook; thick masses of clouds had settled upon the

mountains, and we could scarcely see half across the glacier. At five o'clock Simond reappeared: he thought we had better start, but that if the weather did not mend by the time we reached the foot of the mountain we should inevitably have to return. We got under weigh soon after five, and walked by the glacier side to the foot of the cliff, distant about half a mile from the châlet, when it began to rain so violently that we were obliged to seek shelter in a small hovel which we fortunately found there, and which is the most advanced outpost of the pastures of Corbassière. After a delay of about an hour the weather cleared a little, we resumed our march, climbed up the cliff, and walked along the oldest moraine to a point nearly opposite the foot of the Combin.

We then struck right across the glacier, and began to mount the steep slopes of frozen snow which lie on its western side. As I was pressing heedlessly forward, I suddenly lost my footing, and began to slip down rapidly towards a great crevasse which yawned beneath. I happily succeeded in stopping myself just on the upper edge of it, but had I not done so, Simond would have saved me: he was a yard or two in front when I fell, but he dashed down the snow like lightning, and was by my side at the very moment that I stopped.

The usual *bergschrund* next presented itself: it was not very deep, but too wide to jump with safety, and no bridge could be discovered. A great discussion took place among the guides as to how it was to be crossed, and Felley suggested filling it up with snow. At this Simond tied the end of the rope round his waist, and taking a run cleared the crevasse, and clutching the rocks on the other side climbed up to a firm standing-place, and hauled the rest

of the party across, one by one. Then came a steady pull of several hours up a rugged slope of steep rocks, which at last ended in a single point, and we had nothing before us but the snow peak itself. We sat down and rested for a few minutes, and debated the best method of continuing the attack. We were standing at the vertex of a great triangle of rock which forms the principal part of the eastern face of the mountain. Before us was a dazzling cone of frozen snow of extreme steepness, rising from far below on either side, and terminating in a very acute point some 200 feet above our heads. Two courses were open to us; either to cut steps directly up to the summit, or to go in a more horizontal direction, and take the shortest cut to the right-hand edge of the peak, which was much nearer to us than the other. We determined upon the latter plan, as it gave us the benefit of the chance that the snow might be less inclined beyond. Simond and Felley worked with the axe by turns, and when the line of steps was completed, we tied ourselves together and advanced cautiously towards the edge. When we arrived there, we found it to be a steep and very thin knife-edge; by the active use of our feet and alpenstocks we forced a passage through it, and, turning sharply to the left, cut another line of steps on the further side, and in a few minutes gained the summit.

It was just twelve o'clock. We drank off a bumper to the health of the Grand Combin, and shouted wildly with delight. This then was the inaccessible mountain, whose top we had reached in six hours of easy walking from Corbassière! A narrow snowy *arête* extended from the summit in a south-westerly direction, and at its extremity was a little patch of rocks, only a few feet lower than the peak itself. As this offered a much more convenient resting-

place, we crossed over to it and began to reconnoitre our position. Heavy masses of black clouds floated around and below us, through which here and there only could we catch glimpses of the mountain world beyond. Straight across the Val de Bagnes were the dark crags of the Mont Pleureur, and far away northward was the well-known form of the Dent du Midi. Making every allowance for the cloudy weather, I was greatly disappointed with the point of view; for it was quite evident that, even if it were perfectly clear, our position would not command that extensive panorama which we had anticipated. The Combin appeared to be situated between two vast snow basins; one on the side of the Val d'Entremont, and the other that of Corbassière. Suddenly the clouds in the latter direction drifted away, and disclosed to view a magnificent snow mountain at the very head of the Corbassière basin. There was no mistake about it; it was the one we had so minutely examined a few days before from the summit of the Dent du Midi. Studer's map was immediately brought out, and our position carefully studied. We were evidently standing at the point marked Petit Combin on the map, while the words Grand Combin occupied the place of the mountain we were looking at. We then formed ourselves into a Court of High Commission, and arraigned Felley on the capital charge of having brought us to the top of the Petit instead of the Grand Combin. He indignantly pleaded Not Guilty: "That dome of snow below us was the Petit Combin; as for that mountain yonder, that was quite another thing." "What was that, then?" "That was the Graffeneire;" a name previously unknown in Alpine travel. "But it was much higher than where we were." "Oh, yes, very much." "Very well, the

Graffeneire was what we wanted to go up." Felley shook his head: "Sur cette montagne-là," said Louis Felley, "personne n'a jamais foulé le pied." I distrusted Felley, at first; but many subsequent inquiries convinced me that he had given the real nomenclature of the Val de Bagnes, and although it is different from that in use throughout the rest of Switzerland, I believe the Bagnes names to be correct, and shall therefore use them in the present paper.

The only instance in which the name Graffeneire occurs in Studer's map is in the words "P. de Graffeneire," which mark the position of a very curious semicircular opening in the ridge, pointed out to me by Felley as the "Passage de Graffeneire." The Graffeneire lies nearly north and south, being part of the same range as the ridge of Corbassière, and the "Passage" may be considered as the northern limit of the mountain. At the south-western end of the Graffeneire is a snow col, 1000 or 1500 feet lower than the "Passage," and which we supposed would lead either to Ollomont or Chermontane. A range of mountains, containing two peaks of considerable height, circles round from the Combin to this col, and completes the enclosure of the Corbassière basin on the western side. A glance at Studer's otherwise admirable map will show how incorrectly it represents this region.

As we felt a strong desire to scale this peak, the same which had been pointed out to us from the Vélan as the Grand Combin, we examined the face of the Graffeneire very attentively. Nowhere else have I ever seen such amazing masses of broken snow; but it seemed that with care it would be possible to thread our way among them. Simond, however, declared it would be madness to attempt to go up on

this side, on account of the danger of avalanches, and that if the ascent were to be made at all it must be on the other. We acquiesced reluctantly, and foolishly, too, as the event proved: indeed, so far as my experience goes, it is impossible to place the least reliance upon the opinion of even the best guide on the practicability of a mountain ascent, when formed from mere inspection from a distance, and not from actual trial.

We built a cairn on the rocks, and put a bottle in it containing an account of our expedition, which I fancy is likely to remain there undisturbed for many a long year. We then descended the mountain on its southern side; and after beating through a thick snow storm, at last reached the névé. We were racing gaily along when I heard a sudden shout behind me, and looking round could see nothing of my brother but a head and a pair of arms. He had fallen into a hidden crevasse, which Felley and I had passed in safety, and was clinging on to the side of it. To seize his hand and pull him out was the work of a moment: he had a most providential escape, and described the sensation of his legs dangling in the cleft as something the reverse of agreeable. If we had been tied together, such an accident would not have been attended with the smallest danger; and we were very imprudent in crossing the névé without using the rope. At six o'clock we regained the châlet, in the midst of a heavy rain.

We employed the evening in discussing the plan of our future operations. The next point to make for was Chermontane. When there, we could examine the eastern face of the Graffeneire, explore the little-known Chermontane glacier, and try to get from it on to that of Arolla, by a pass which Forbes supposed to exist, and which we con-

cluded must be at the spot marked Crête à Collon on Studer's map. Felley knew a short cut into the Val de Bagnes, which would save us the trouble of going back to Lourtier. But then we had only provisions left for another day, and what were we to do for food when we got to Chermontane? Louis Felley at once solved this difficulty. He would start very early in the morning, go down to Chables, and bring some fresh supplies up the valley. As he might not be able to reach Chermontane, we agreed to bivouac the next night at the châlets of Vingt-huit, which lie about an hour lower down. Even then he would have a walk of some four-and-twenty miles.

At eight o'clock on the 19th we left the châlets and mounted the steep pastures behind them up to the crest of the ridge. Felley first took us to a gap called the "Col des Morts," which overlooks a sheer precipice of many hundred feet, at the bottom of which we could just see the Pont de Mauvoisin, through a break in the thick mist. A little further is another opening, called the "Col des Pauvres," at the head of a steep and narrow gully leading down to the Val de Bagnes. We crossed the col and descended the gully very carefully, and then struck along the mountain to the right, in order to hit the bottom of the valley as high up as possible.

A little below the pastures of Torembec we gained the track, which keeps the left bank of the Dranse as far as the extremity of the Zessetta glacier. Here the river is crossed by a wooden bridge, and a few yards higher up on its eastern side are the châlets of Vingt-huit. My journal of this day's work is very meagre; a steady soaking rain commenced soon after we started, and continued all day

without the least intermission. We were drenched to the skin, when at six o'clock we reached our resting-place for the night.

We took up our quarters in a large stone cow-house, which would have been a very comfortable lodging if the whole of one end had not fallen in. It was full of goats when we entered, which were expelled with much difficulty at the point of the alpenstock. All our extra clothing had gone to Zermatt, so that we had no change. We soon kindled a blazing pine-wood fire, and driving our alpenstocks into the wall a few feet above it, took off our principal articles of dress and hung them up in the smoke to dry. We then twisted hay-bands round our feet, after the fashion of her majesty's soldiers in the Crimea. Simond went off to the nearest châlet, and soon returned with a berger, bringing a great copper vessel half full of milk, and one wooden bowl. The milk was soon boiling, we brewed some magnificent chocolate, and ladled it out of the kettle with the bowl. We should have made a capital supper had we not been on half rations of bread, being obliged to keep enough for breakfast on the morrow, lest any accident should befall the porter. Our cow-house seemed to be a regular place of resort for the chasseurs of the neighbourhood; several came in during the evening, among them an old man, one of the most miserable specimens of humanity I have ever seen, who got his living by trapping marmots. We were warned by the berger not to lie in the old hay, which, he said, abounded in *mauvaises bêtes*, but to choose in preference a pile of new which had recently been brought in. But the new hay was so sodden with wet that this was out of the question; and utterly regardless of the unseen horrors, we flung ourselves down

upon the ancient heap, and in a few minutes were sound asleep.

The next day the morning sun shot his bright beams into our sleeping-place; we rose up, stepped out of the building, and were greeted by a cloudless sky. Our porter had arrived at midnight with a bag full of provisions, and a letter from the landlord at Chables, asking us to send him our names and addresses, to be inserted in the archives of his house in connection with the successful ascent of the Combin. I cannot refrain from giving this letter in full, as a specimen of the way in which the more intelligent natives of Bagnes deal with the French language. Here it is: —

"Messieu setous seque je cregnes de votre voyage le moves tęn a presen que jay a pri que vous aves fes lensensyon du mon combin eureusemen je sui toutafes sastifes et je sui tres conten pour vous je vous prye de men voyes votre non et votre adresse par votre gide loui felay que jay toute confiyense.

"je vous salue votre serviteur

"PIERRE PERRODIN, à Bagnes."

We gave Benjamin Felley four days' pay and dismissed him, as he was not acquainted with the neighbourhood of Chermontane. For knowledge of the district we had been in, we found him a good guide, but he was slow and fumbling, and constantly annoyed us on the march by turning round and stopping when he had anything to say. Louis Felley went with us to help to take the provisions to Chermontane: he had proved a most active assistant, and always ready and obliging when there was anything to do.

We left Vingt-huit at 5 A.M., and recrossing the Dranse,

by another bridge a little higher up, followed the track along its western side. The first glacier that was passed was that of Breney, on the eastern side of the valley. This evidently has been retreating, and has left behind it an amazing pile of rubbish. Forbes was assured that in 1822 it had increased so much that it had crossed the Dranse, and risen to a great height on the other side. We next came to the glacier of Mont Durand, which descends from the south of the Graffeneire, and extends right across the Dranse, which flows through an icy tunnel underneath. We crossed this glacier on to the pastures of Chermontane, and then came full in view of the magnificent ice field of the same name, an almost unknown region, to the exploration of which we had determined to devote the day. The Graffeneire was not forgotten in the morning's walk. We had carefully scanned it from time to time, to see if there were any parts of its eastern face which offered the smallest prospect of success. But it rose sheer up in black precipices of frightful steepness, to a vast height above the valley, and was evidently hopeless in this direction. From the pastures of Chermontane we could see straight up to the Col de Fenêtre, guarded on the left by the dark cliffs of Mont Gélé, and on the right by the lower pyramid of Mont Avril. As the Mont Avril is separated from the Graffeneire only by the glacier of Mont Durand, we saw that it would be an admirable point of view for studying that perplexing mountain, and thinking, too, that a fine day would be better spent on a mountain top than in a valley, we abandoned our intention of exploring the Chermontane Glacier, and sending Felley to the châlets with the major part of the provisions, resolved to ascend Mont Avril. Leaving to our left the path leading to the Fenêtre, we took a slanting track up

the mountain, and after toiling through the loose slates of which it is composed, reached the summit at noon.

I do not know the exact height of Mont Avril. The Col de Fenêtre is 9,200 feet, and the Avril must certainly be more than 1000 feet higher. It is probably about 10,500 feet; some 500 or 600 feet lower than Mont Gélé. After all, for the thorough enjoyment of an Alpine view, there is nothing like a mountain of from ten to twelve thousand feet, provided it is sufficiently distant from overtopping peaks. The greater mountains are not dwarfed from it, the summit is gained without fatigue, and almost any length of time may be spent there. We found Mont Avril such a point of view. Our first attention was, of course, directed to the Graffeneire, which rises on the opposite side of the glacier of Mont Durand. The slaty beds of which the Avril is composed dip south-west, and crop out against the glacier, forming an escarpment of great depth and steepness. The other side of the glacier is bounded by the cliffs of the Tour de Boussine, a huge buttress of the Graffeneire, and which are fully as steep as those which rise from the Val de Bagnes. But what interested us the most was to observe, at the extreme south-western angle of the mountain, the identical col which we had seen from the Corbassière side, and which evidently formed a snow connection between the two glaciers. I felt quite certain that this col might be passed, if we could once get up the glacier of Mont Durand, which is greatly crevassed in its middle part; and Simond gave it as his opinion that it was by the shoulder of the Graffeneire, which comes down to the col, that the ascent of the mountain might most easily be attempted.

The Combin was hidden by the Graffeneire, but westward

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was the great white dome of the Vélan; to the south lay the Val d'Aosta, and beyond it the many peaks and glaciers of the Montagnes de Cogne. Eastward, almost at our feet, were the shining ice fields of Breney and Chermontane, looking like a single glacier clasping the Pic d'Otemma in its snowy arms. Just beyond the former, but much higher up, was a snow col, which appeared to lead across the ridge separating the Val de Bagnes from that of Hérémence, and which we judged rather higher than our standing-place. This was the Col du Mont Rouge. The ridge itself was crowned by the rocky summits of the Arolla, Rouinette, and Mont Pleureur, and in the far east was the Great Matterhorn, which, with its base hidden by a cloud, seemed a gigantic rock suspended in the sky.

When we had sufficiently enjoyed this splendid panorama, we ran rapidly down the mountain to the lake on the Italian side of the Fenêtre, and crossing the col, skirted the glacier to the châlets of Chermontane. This was a much more extensive establishment than any we had previously visited; nine bergers lived here, and there was a herd of 120 cows, besides a large number of goats and sheep. Our arrangements for the morrow were yet undetermined; we should have liked to have attempted the Graffeneire by the glacier of Mont Durand, but this would have necessitated another day at Chermontane, and we should have had to send to Chables again for a further supply of provisions. We were anxious, too, to get to Zermatt, which was new country to us. We found the bergers remarkably ignorant about the neighbouring passes; of the Crête à Collon they knew nothing, and the only information we could get from them was, that we might go by the Col de Crête Sèche to Biona, or by that of Mont Rouge to

Hérémence. In these difficulties, we took their advice of sending down to Gétroz for Bernard Trolliet, "le premier chasseur de Bagnes," who, they assured us, knew the mountains well. If he could not be found, our plan was to go up towards the Crête à Collon, and if that appeared unpromising, to cross the Col de Crête Sèche. In the meantime, we strolled out to the glacier, but had only time to examine it in a very cursory manner. Unlike its neighbour of Breney, it was advancing and ploughing up the pasture before it. The principal medial moraine appeared to descend from the Truma des Boucs, and mark the boundary of the affluent from the Crête Sèche. We passed from the glacier to the pastures of Chanrion, where there are two small lakes, one lying against the ice, fed by the glacier water, and the other of spring water, a little distance from it. We bathed in the latter, and then sat down on the grass and studied the Graffeneire, which was visible from the Passage to the Col.

The derivation of the names of the Val de Bagnes would be an interesting subject for discussion. Simond always persisted in calling the mountain L'Agrafe Noire, a name more applicable on this side than the other. According to Forbes, Chanrion is *champ rond*, but I do not know if he has any authority for this derivation; the spot did not appear to have anything particularly round about it. To us came a whisper of pleasanter things, as we lay in the sweet afternoon sunshine, stretched upon the tender herbage, admiring the black cliffs of the Graffeneire, and idly gazing into the purple sky. These sweeps of smiling mountain pasture, decked with cream-coloured pyrolas, and azure stars of gentian, and hundreds of other beautiful Alpine flowers, were *les champs riants de la chère montagne.*

Evening drawing in we returned to the châlets, having to go round by the glacier again, there being no other way of getting over the Dranse. When we arrived there, the cows had just come up to be milked; and the three milkmen, walking about with their one-legged stools strapped on behind them, had an irresistibly ludicrous effect, suggesting the appearance of the principal actor in the Devil's Walk.

Late at night Bernard Trolliet arrived. He undertook to take us in one day, by the Col du Mont Rouge, to Evolena, the point we wanted to make for. We might, if we chose, he said, go by the Col de Collon, but this would involve a two days' journey by way of Biona and Prarayen. As for the glacier of Chermontane, the head of it was absolutely "barred;" he had once followed a chamois to the top of the Pic d'Otemma, and examined the Crête à Collon, and, we might take his word for it, we could not get across. We of course decided upon the Col du Mont Rouge, which was evidently a very fine pass; but I do not consider even Trolliet's opinion as absolutely decisive against the Crête à Collon, and I shall certainly attempt it if I ever again visit this locality. A place must be actually tried before it can be pronounced impossible; and, I am sure, no one who saw the Strahleck for the first time from the Aar glacier, would conceive it possible for any one to get up it.

We lay down in the hay at one end of the châlet, and tried in vain to sleep. Cheesemaking operations were protracted with great clatter until nearly midnight; and when at length the bergers retired to rest, they kept up an incessant conversation in the hideous vernacular of the valley, all talking at once, and as loud as possible. Si-

mond expostulated without effect, and we thought with regret of our quiet retreat under the stone at Corbassière. At the first glimmer of early morning we made our escape from the châlet, breakfasted, and at half-past four we were again *en route*.

It was very annoying to have to quit Chermontane, leaving so much undone. We should have liked to explore the glaciers of Mont Durand and Chermontane, to have attempted the Graffeneire from the Col, to have ascended the Pic d'Otemma, and examined the Crête à Collon. I know scarcely any part of Switzerland from which so many interesting excursions might be made, but it will never be generally visited until some better accommodation is provided than that which exists at present. There is some talk of building an inn at the Pont de Mauvoisin; this will be a great improvement; but the greatest assistance to tourists would be a little inn, open during the summer, not far from Chermontane, a luxury which, I fear, is not likely to be afforded just at present.

We descended the valley again; and when we got to the glacier of Mont Durand, instead of taking our previous track, struck down to the right, and so crossed to the eastern side of the Dranse. This glacier was exhibiting great activity. Not only had it crossed the river, but it was thrusting itself against the slopes of Chanrion, and ploughing up the pasture just in the same way as the glacier of Chermontane. Having climbed up the rocks by the side of the glacier of Breney, which is very steep and broken in its lower part, until we came to a place where it was less inclined, we took to the ice, and made for the opposite side. Great as was the evidence which the terminal moraine of this glacier had afforded of its

retreat, it sank into utter insignificance compared with that now presented to us. Having crossed an ancient lateral moraine of very considerable dimensions, we came upon the present one, rapidly grassing on its outer slope, soon doubtless to be stranded like the other. Higher up, both were merged in a wide belt of rocks which had fallen from the Pic d'Otemma—an amazing waste of ruin. There are two medial moraines, of which the northern descends from the rocky promontory separating the glacier of Breney proper from its tributary of Rouinette. This soon blends with the lateral moraine, and forms, on the northern side, an extent of desolation even greater than that on the other. These effects would naturally be produced by a glacier slowly but continuously shrinking. We noticed another remarkable peculiarity. The principal crevasses instead of being transverse, were longitudinal, and were so wide and numerous that we were upwards of an hour in effecting the traverse. This was evidently due to the bounding-walls exerting little pressure upon the ice, but leaving it free to expand laterally at the same time that it moved down its bed.

Having at last got safely across, we mounted the rocks before us, and after a fatiguing climb, reached the névé of the glacier of Lirerouge, which nestles in a little hollow just under the Pic de Rouinette. Here we put on the rope; Trolliet went first, my brother and I were in the middle, and Simond brought up the rear. It is with glaciers as with the troubles of life, some of the smallest are the most provoking. We found the névé of Lirerouge a perfect network of concealed crevasses. We could not make the circuit of the basin for fear of avalanches from the Rouinette, and so were obliged to go straight across it with great care. Notwithstanding incessant harpooning,

about every five minutes Trolliet sank to his middle, but he always managed to struggle out without assistance, and went on again as if nothing particular had taken place. At length we reached the col which divides the névé of Lirerouge from that of Gétroz, and turned round to see the view, which is one of great magnificence. Just across the valley were the black masses and pinnacles of the Graffeneire, and, farther to the left, the Monts Avril and Gélé were seen to great advantage. In the northern mid distance was our old friend and constant companion the Dent du Midi. But it was impossible to face the Val de Bagnes for more than a few seconds. A south-west wind blew a perfect hurricane across the col, in occasional gusts of such violence, that there was nothing for it but to crouch down as low as possible, and hold on by our alpen-stocks thrust into the snow. Our route now lay along a snow flat forming the upper part of the Gétroz glacier, and beneath a lofty ridge on the right terminated at either end by two high peaks; the nearer of these is the Pic de Rouinette, and the farther, the Mont Blanc de Cheilon. Opposite to these, at a little distance, is the Mont Pleureur. Travellers who are surprised that so insignificant a glacier as that of Gétroz should have produced such lamentable results, would, I think, form a different opinion if they traversed the snow fields from which it flows.

Having crossed the névé of Gétroz, we arrived at a second col, just opposite the first, leading over to the glacier of Hérémence. The snow was too crevassed to descend upon it at once, so we made a detour over the rocks, and got on the glacier a little lower down. We there found an asylum from the wind, which had hitherto pursued us with unrelenting fury.

There is a strange confusion in the naming of this glacier. Forbes, Studer, and Escher call it respectively Lenaret, Durand, and Liapey. According to Trolliet, it was the Glacier de Hérémence, an appropriate name enough. Forbes thought that there might be a pass on to it from the glacier of Chermontane. But this is most improbable, not to say impossible, as it is shut in on the south by the Mont Blanc de Cheilon and the Pigne d'Arolla, and the two glaciers of Breney and Otemma intervene between these mountains and the glacier of Chermontane. We walked on until we came to water; and, meeting with a very inviting glacier-table, applied it to the purposes of its more useful domestic namesake, spread our provisions upon it, and dined with an enjoyment which none but a mountaineer could in the least appreciate.

Had we pursued the glacier to its extremity, we should have descended into the Val de Hérémence, which was anything but what we wished to do. A mountain ridge, extending from Mont Blanc de Cheilon and the Pigne d'Arolla, bounds the glacier on its eastern side; and Trolliet pointed out a low place in it where he said our route lay. When we had arrived beneath it, we found a very narrow ledge of rock leading up to a little col. Trolliet said he could pass without difficulty; but it looked so ugly that we preferred keeping to the right, and crossing the ridge at a higher level, we got easily down to the other side. On Studer's map are the names Pas de Chèvre and Pas de Riedmatten near this spot. I believe the Pas de Chèvre is that which we crossed, and that the other is a more circuitous path somewhat lower down.

We now found ourselves at the head of a desolate valley

communicating with the Combe d'Arolla, savage with piles of broken rock, and ghastly stems of scorched and withered pine. The path lay not far from the glacier d'Otemma, which has shrunk and left behind it a stranded moraine. As we neared the Combe, the magnificent dome-shaped mass of the Mont Collon, with its black buttresses of rock too steep for the snow to cling to, burst upon our view. Below it lay the glacier of Arolla, on which I witnessed, for the first time, the phenomenon of the hyperbolic dirt bands; these were exhibited with the greatest distinctness, and extended up the glacier as far as we could see.

A short distance down the Combe we came to some châlets, and here, for the first time since we had been in Switzerland, our request for milk was emphatically refused. We could not understand it at first, but Simond soon ascertained the reason. We had come from Chermontane, where there was a malady among the cows, and the bergers feared that if we drank milk at the châlets their herd would immediately catch it. After much discussion they relented, and consented to supply us on condition of our sitting behind the châlets some distance off. A sharp walk of three hours brought us to Haudères, where we arrived fourteen hours after quitting Chermontane; and learning that Pralong had a châlet here where his father and daughters lived, and *took in* travellers, we determined to stop, and save the unnecessary trouble of going down to Evolena.

The Col du Mont Rouge is inferior in interest to very few of the great snow passes of the Alps. It is between ten and eleven thousand feet high, probably nearer the latter, and is the only means at present known of passing

in one day from the Val d'Erin to Chermontane; five glaciers are crossed, and several others skirted, on the route. We imagined that we were the first travellers, or at least the first Englishmen, who had passed it; but this is not the case. It was crossed, in 1855, by Messrs. Kennedy, Ainslie, and Stevenson, on the way to their memorable ascent of Mont Blanc. They took the col in the opposite direction, sleeping at the châlets we had stopped at on the Montagne d'Arolla, and walking straight on to Valpelline, which they reached in twenty-one hours, including three of rest and detention from bad weather. Pralong was their guide across the pass, and he turned back at the glacier of Breney. Kennedy considered the view of the Graffeneire, which came suddenly upon them when they gained the col, as one of the most striking he had seen among the Alps.

We gave Trolliet fifteen francs for two days' pay and a "bonne main," and Simond's pay and a moderate sum for provisions made a total of about thirty francs, so that fifteen francs apiece was the cost of a col of the same order as the Géant or the Erin. Trolliet had led the way with singular spirit and sagacity, and had completely vindicated his title of "le premier chasseur de Bagnes."

We found the Eringers very different people from those of Bagnes. Indeed, the feelings with which they regarded travellers savoured strongly of Chamouni, and there it is possible to get what you are obliged to pay for. Les filles Pralong were exceedingly obstinate and unpracticable; Simond had to cook our supper himself, and had the utmost difficulty in dragging the necessary ingredients from the stores of the house. A guide for the Erin was the next desideratum. Pralong *grand père*, an ancient gen-

tleman, verging on eighty and bent almost double, was importunate to be engaged, telling us he was "très-robuste." This was simply ridiculous, and the only man Simond could find who knew the pass was one Follinnier, M. le Président, as he was called. He modestly demanded forty francs for the excursion, but finally consented to take thirty, on condition of being allowed to return when we got to the gazon. When we had the next day reached the base of the Wand Fluh, scarcely half across the glacier, Follinnier pointed to a piece of bare rock, exclaiming, "Voilà, monsieur, le gazon," and demanded payment and dismissal. I think it my duty to gibbet him here, as a warning to future travellers.

At seven o'clock on the Friday evening we arrived at Zermatt, and directed our steps to the comfortable "Hôtel du Mont Rose," where we were fortunate enough to find our knapsacks. We had had a most interesting excursion: for four consecutive nights we had slept in our clothes, and for nearly a week had not seen a trace of tourists or civilisation. The clean beds and good table d'hôte of the hotel were none the less welcome. Notwithstanding the use of veil and spectacles, the constant glare of the snow had made my eyes very weak and painful, but my brother did not experience the smallest inconvenience.

Excursion of 1857.— *The Graffeneire.*

THE campaign of 1857 was undertaken in the company of my cousin, Mr. B. St. John Mathews, and had for its principal object the siege of the Finsteraarhorn. We had written to Auguste Simond to meet us at Grindelwald, and he brought with him his cousin, Jean Baptiste Croz, who being several

years younger than Simond was even his superior in energy and muscular power, although less practised in all those little offices of personal attention which render the best guides of Chamouni such useful and agreeable travelling companions. Messrs. Kennedy, Hardy, and Ellis joined us in Switzerland, and the attack of the united party, which is described in another part of this volume, was crowned with the most complete success. We were imprisoned by rain and snow at the Æggischhorn for three days before starting upon the expedition, and the day after our return we were fairly driven down into the Rhone valley by a relapse of miserable weather. Hardy and Ellis went on to Zermatt; and Kennedy, St. John, and I descended the valley to Sion, where I expected to receive letters.

We spent Sunday the 16th of August in the salon of the Hôtel de la Poste, in the melancholy capital of the Valais, cheered by the enlivening sound of the heavy rain pattering against the window panes. We had written long letters home, brought our journals up to the most recent date, put all our plants into dry paper, and were speculating where we should go if the weather, which had nipped our excursion in the bud, should ever clear again. At this moment Simond dashed into the room; "Monsieur," he exclaimed to me, "j'ai quelque chose à vous dire; on a fait l'ascension de la Graffeneire." He had read the account in a number of the Courier du Valais, and urged me to come and satisfy myself. I found the paper in a neighbouring café. The article related how two chasseurs of Lourtier, Maurice Felley, and Juvence Bruchey his nephew, had on the 20th of July successfully reached the summit of that hitherto untrodden mountain; how they quitted Lourtier

for the expedition amid the sobs of the inhabitants, and were welcomed back again upon their return as if they had been snatched back to life from the horrors of the nether world. In fact it was a perfect gem of composition, and if I had had at the time the smallest idea of writing this account, I should certainly have secured the paper and reproduced the article here. One important point it conclusively established; the great mountain of the Val de Bagnes was known in the Valais as the Graffeneire.

My resolution was at once taken to start for Chables in the morning. My two companions were deaf to all entreaties to accompany me; Kennedy despaired of the weather; my cousin would go to St. Gervais, sit down before Mont Blanc and make certain of it; the two mountains, he was sure, the weather would not suffer to be accomplished in the time we had at our disposal, and for his part he preferred Mont Blanc. I thought differently, and determined to try to get to St. Gervais in time to join in his ascent. The next morning we went in a carriage down the Rhone valley; I got out at Riddes, retaining Simond; the two others parted at Martigny, St. John taking Croz to St. Gervais, and Kennedy going to luxuriate at Vevay.

A track leads across the mountains from Riddes to Chables, over a pass described in some maps as the Col de Verbier, and in others as the Col des Etablons. It ascends in steep zig-zags up the grassy wall of the Rhone valley, where every here and there, hundreds of feet above the river, peep out smooth sheets of rock polished by that wonderful ancient Ice Sea which reached from the Galenstok to the Lake of Geneva. Farther on the path winds through the pleasant pastures of the Commune of Riddes, above the deep valley of La Fava, across which we had

glimpses through the clouds of the numerous châlets of the mining population of Iserable. Higher up are extensive pine woods with a thick undergrowth of fern and rhododendron, among which I found some magnificent clusters of *Cistoperis montana*. We soon crossed the upper limit of the pine zone, and climbing some steep slopes of stunted grass, stood upon the Col.

In cloudless weather there must be a remarkably fine view from this position, as it must command the Alps of the western Oberland on the one side, and on the other the summits of the Graffeneire and Combin. But we were not so favoured; during the whole morning the opposite side of the Rhone valley had been veiled in cloud, and there was so thick a mist upon the Col that we could scarcely see a yard before us. By following the water we got safely down to Verbier, and at three o'clock we were in our old quarters chez Pierre Perrodin. A messenger was instantly dispatched to Lourtier to bring down the chasseurs, but they did not arrive until ten o'clock the following morning. I questioned them closely about their former expedition, ascertained that they had really reached the summit, and that the ascent was made, as I had anticipated, by the snow slope on the Corbassière side.

They asked thirty francs apiece, which I thought extravagant, but consented to give it upon condition that on descending the mountain they would accompany me across the Col on the south-west of the Graffeneire, connecting the glaciers of Corbassière and Mont Durand, and that we should attempt to force a passage either to Ollomont or Chermontane. As it was uncertain how long the weather would detain us at Corbassière, I determined that the commissariat should be ample for three days, and hired a

mule to carry the provisions to the châlets. Two hours sufficed to engage the chasseurs, agree with the muleteer, pack my knapsack, make ready the provisions, arrange the baggage on the mule, and settle the bill with Perrodin, and at noon we were ready to start. The first article on the mule's back was a mattrass. Had I seen this before, I should have discarded it as a useless piece of lumber, but I did not think it worth while to unpack the other things on its account.

When we got to the slopes of Corbassière we found that the recent snow had quite covered all the upper pastures, and that the establishment had consequently been brought much lower down the mountain. As it was very important to sleep at the highest possible point, we borrowed from the berger a copper kettle and some wooden bowls, and tied them on the mule's back along with a large bundle of firewood. We then filled two pails about half full of milk, and slung them on to our alpenstocks, and carrying them two and two, the party resumed its march. Passing our camping-place of the preceding year, we arrived at five o'clock at the hovel at the base of the cliff, where we had sheltered from the storm, which was to be our resting-place for the night. The range of Combin and the upper glacier were covered with dark clouds, which augured ill for the morrow. We unloaded and picketed the mule, and were soon seated round a good fire, enjoying an excellent supper. When the milk was boiled and the bowls filled, Simond suddenly produced several iron spoons: I remonstrated against such a luxury, and he replied, "You remember, sir, last year, that at Chermontane there were no bowls, and at Corbassière there were no spoons, and I determined to be provided this time."

The following day, Wednesday, the 19th of August, was

ushered in by a beautifully-cloudless morning. As our passage of the Col was somewhat doubtful, I directed the muleteer to take the provisions we did not want to carry with us, and *cache* them at the châlets below, making quite sure that if we were obliged to return the same way, we could reach those châlets in the evening; the mule and the other things were then to go to Chables.

We started at three, ascended the cliff by lantern light, and walked along the old moraine, having the Graffeneire full in view, which presently lighted up, and, crimsoned by the morning sun, looked magnificent indeed: I was now able, for the first time, to study the actual summit of the mountain; it consisted of two peaks, very near together and of nearly equal height. Instead of crossing the glacier towards the Grand Combin, as we had done the year before, we kept under the rocks on the left, walking along a belt of piled and tottering fragments, with quantities of fresh snow filling the interstices. These piled rocks are troublesome enough to walk over when there is no snow, but when it is uncertain whether you are about to set your foot on a firm surface, or to be let in up to the hip, they are extremely trying. We were not sorry to leave them, but the moment we stepped upon the glacier we sank in above the ankles; it was covered with a coating of soft snow at least twelve inches thick. I now saw the task that lay before us, but determined to proceed, notwithstanding; and having frequently to make long detours to get round the crevasses, we toiled manfully through the snow to a point at the base of the mountain about an hour on this side of the Col.

We arrived at this point at twenty minutes past nine, having been upwards of six hours in performing what the

chasseurs had accomplished on the first ascent in less than half the time. I called a halt and a second breakfast, and we lay down in the snow and rested half an hour. Here Bruchey, the younger guide, who had previously told me that he was "chasseur de chamois, par passion," said that he was very sorry, but that he really could not go on; he had shown signs of distress for some time, and was fairly exhausted by the arduous labour of the last six hours. I told him to lie where he was for the present, and when he was sufficiently recovered, to go up to the Col, and see if we could descend on the other side; as for us, we would go on, and endeavour to make the ascent without his assistance.

The snow on the mountain was even worse than that on the glacier; its surface was frozen into a crust which was not strong enough to bear the weight of the body, but which at every step resisted for a few seconds, then broke and let the foot suddenly in; it was so deep that frequently when the slope was steeper than usual, my knee was beneath the level of the snow in front. In such circumstances the foremost man has the hardest work, those who follow and step in the holes which he has trodden having a comparatively easy task. When there is a large party, although the progress is slow, the fatigue is greatly diminished by each man taking the lead in succession; but we were only three, and Felley had come up rather against his will, and was not good for much. The lion's share of the work accordingly fell to Simond. I suppose he led for about half the time, and that Felley and I divided the other half between us. We had less difficulty in threading the crevasses than I had anticipated. We passed under many lofty walls of snow, shining with green light, and although we crossed the broken remnants of numerous avalanches, we were not

even alarmed by a single fall. At last we got entangled in a network of wide fissures from which we could find no outlet. I then began to consider whether I was right in dragging these two men through all this toil merely for my own gratification. Felley I knew would be glad of any excuse for retreat, so I turned round to Simond:—"Do you think," I said to him, "that it is really worth while for us to go on? It is very hard work, it is getting very late, and after all we may not be able to reach the summit. I place myself entirely in your hands, and if you decide to turn back, I have no objection." His reply was decisive and characteristic, and deserves to be recorded. "Non, monsieur! Il faut continuer, il faut aller toujours doucement, il ne faut jamais se désespérer d'une ascension." "En avant donc," responded I, and in a short time we were clear of our difficulty, and by proceeding very quietly we at length succeeded in reaching the crest of the mountain, at the top of the precipices of the Val de Bagnes. Nothing now remained but the two peaks, which lie in a line nearly north and south, with a little col between them. We were at the base of the northern, the one the chasseurs had ascended, and not knowing which was the higher, immediately attacked it. It was rather steep, but Simond's energy appeared to increase as we neared the summit. He went first and kicked great footholes in the snow, I followed immediately, and we were soon seated on the top of it, where there was about space enough to hold the three.

The brilliant promise of the morning had not been fulfilled. The clouds had begun to gather about nine o'clock, and got lower and thicker almost every minute. When we were on the summit, not a single peak was visible

beyond the Val de Bagnes, and only at intervals there came glimpses of the glaciers of Breney and Chermontane, and the green lakes of Chanrion shining like emeralds five thousand feet below. Westward, we looked down upon a boundless sea of white rolling cloud, whose billows broke against a solitary snowy height. From time to time we had seen this mountain during the ascent, and I had as often said to Simond, "Look, there is the Vélan; how little progress we are making, as we have not yet left it below us." It was the summit of Mont Blanc! In one direction only was the prospect clear. We could see the whole length of the glacier of Corbassière, with its bounding ranges, the Grand Combin itself scarcely distinguishable among the neighbouring peaks. Opposite to the Graffeneire, the rocky boundary of the glacier appeared broken into three bays; we could see straight up the southern of these, and as the peaks were much lower at its extremity, I thought it possible that a passage might exist to St. Pierre.

Disappointing as the prospect was, our position on the summit was even more unsatisfactory. The southern peak raised its highest point some twenty feet above the one on which we stood. It could evidently be climbed without much difficulty; was there time to do it? The only watch of the party was in Bruchey's pocket, down below, so that we could not tell the time, but we judged it to be nearly three. The ascent had therefore cost us at least eleven hours of actual walking, and there were only five hours of daylight left. I reluctantly decided in the negative, and commenced a rapid descent, leaving the *Aller höchste Spitze* of the Graffeneire as a future reward to some enterprising mountaineer. It was five before we reached the base of the mountain and rejoined Bruchey. He had

been to the Col, he said, and it was impossible to descend upon the other side. I was unable to gather from him the precise nature of the difficulty, and am uncharitable enough to believe that it was in spirit only that he visited the Col. However this may have been, we could not have got there before six, and it would have been madness to have entered upon an unknown glacier at so late an hour. We therefore turned our faces in the opposite direction, and marched towards Corbassière as quickly as the snow would permit. We had judged rightly in hastening down, for as we descended the glacier we were attacked by a heavy storm of rain and drifting snow.

Night closed upon us before we reached the cliff, and we had to grope our way down it by the aid of a lantern, containing only a twisted taper inside it, which was continually going out. At the base of the cliff the taper utterly succumbed, and I thought we never should have found the châlet. We entered it at last at a quarter past nine, after a course of eighteen hours and a quarter, fifteen of which had been actual walking through deep snow. As we had sent everything away in the morning, even the ordinary châlet luxuries were wanting to our supper,—no chocolate or blazing fire, nothing but bread and meat and water, and a hay bed; but we slept soundly on it, notwithstanding. We descended to the lower châlet early the next morning, and breakfasted on our *cached* provisions; Felley and Bruchey left us at Lourtier, and Simond and I reached Chables at ten o'clock.

The total cost of the expedition was nearly five pounds; rather a large sum, but if I had had a companion it would have been no more expensive for the two. Excepting a sunburnt face and parched lips, I was none the worse for

it; but Simond was very unwell; he had contracted an illness which, I grieve to say, lasted several weeks, and which I fear was caused in a great measure by the arduous exertions he had made to land me safely on the summit of the mountain.

The height of the Graffeneire is 14,134 feet*; if the snow were in good order, I see no reason why the ascent should not be made in seven hours from the châlets, and in that case Chables might easily be reached the second night. The view from the summit in fine weather must be one of the most remarkable in the Alps. The northern extremity of the Corbassière glacier has now been pretty well explored, and the attention of mountaineers should be directed to the passes which may lead on to it from the south and west. Attempts should be made to reach it from Chermontane by the glacier of Mont Durand, from Valpelline by the ravine extending above the Châlets of By, and also from St. Pierre. When those avenues have been fully examined, the topography of the district will be completely known.

I stayed four hours at Chables and then went to Orsières, where I was detained sorely against my will the whole of the next day, in an unsuccessful attempt to find a guide who knew the Col du Tour. Failing in this, I took a pleasant mountain track along the valley lying between the main chain and the Mont Catogne, crossed the Forclaz and the Col de Balme, parted reluctantly from Simond,

* Ziegler under "Combin II. höchster Gipfel." King in his recent work, "The Italian Valleys of the Pennine Alps," page 84, gives the height of the Grand Combin (*i. e.* the Graffeneire) as 13,300, and of the Vélan as 10,470 feet. These must be intended for French feet, but he does not say so. Even with this allowance the Vélan is much too low; its height in French feet is 11,674.

and hurried on to St. Gervais. I rejoined my cousin the very evening he had come down from Mont Blanc, where he had found the snow even worse, and the day's work longer, than it had been on the Graffeneire; but his party being larger, the individual labour was less painful, and they had successfully reached the summit. I had hoped to stay at St. Gervais and follow his example, but another relapse of rainy weather drove us away; we quitted the Alps in despair, went by way of Sixt to Geneva, and in a few hours we were in England.

Croz left us at Servoz and returned to Chamouni, where he was fined by that liberal and enlightened community. He had committed the high crime and misdemeanour of ascending Mont Blanc from St. Gervais, contrary to a regulation which had recently been made, and of the existence of which he was not aware. It is difficult to imagine to what lengths these good people will ultimately proceed. They were formerly contented with closing their own route to travellers of ordinary means, they now claim a monopoly of the whole mountain, and will, doubtless, soon extend their regulations to every excursion in the Alps. English travellers, especially those led by love of science or adventure to the higher Alps, have been everything to Chamouni, and have spent their money in the valley with a lavish hand; and yet the petty authorities who rule the commune are neglecting nothing to disgust and exasperate those to whom they owe so much. The system, too, is bitterly detested by the better guides, to whom it is as unjust and oppressive as it is offensive and insulting to their employers.

So ended my last Swiss journey. To those who feel wearied —as who does not at times—with the ceaseless mill-work

of England in the nineteenth century, there is no medicine so soothing both to mind and body as Alpine travel, affording as it does interesting observation and healthy enjoyment for the present, and pleasant memories for the time to come. Very many happy days have I spent among the "Peaks and Passes and Glaciers" of the Alps, but I look back upon none of them with feelings of such great satisfaction as upon those in which I wandered among the unknown fastnesses of the "Montagnes de Bagnes."

W. MATHEWS, JUN.

NOTE BY THE EDITOR.

SINCE the foregoing pages were in type, I have been favoured with an interesting letter from M. Gottlieb Studer, the well-known explorer of the Alps, whose valuable map of the southern valleys of the Canton Valais is now in the hands of every traveller.

M. Studer informs me that during the last year, 1858, he revisited the range of Mont Combin, and accomplished the ascent of the Graffeneire from the side of the Val de Bagnes, but, like his predecessor, Mr. Mathews, he was not favoured with fine weather. Returning to the valley of Corbassière, M. Studer effected the passage from thence into the Val d'Entremont, descending to Alève on the road of the St. Bernard by the "Montagnes des Cœurs" and the Mont Boveyre.

In this excursion M. Studer, like Mr. Mathews, ascertained that the nomenclature of the peaks of this group which is adopted in the Val de Bagnes differs materially from that admitted in his own, and all other existing maps, and he proposes the following changes, in order to reconcile the discrepancies thus caused.

1. He proposes to retain for the highest peak of the group

the name Grand Combin, by which it is universally known to all previous writers, and through the adjoining districts of Switzerland and Piedmont; admitting, however, as a synonym, the local name of the Val de Bagnes — La Graffeneire.

2. The peak named on his own map "Petit Combin," which in the Val de Bagnes and in the foregoing narrative is called "Grand Combin," he proposes, in order to avoid further confusion, to call the "Combin de Corbassière."

3. The Petit Combin, called also in the Val d'Entremont "Dent du Midi," occupies the position indicated in the same map by the name "Les Follats," and the latter name belongs properly to a portion of the range between this and Les Avoulons.

4. M. Studer had placed the name "P. de Graffeneire" in a position that indicated a col, rather than a peak, and Mr. Mathews naturally supposed that the initial letter was intended for the "*Passage*" pointed out to him by his guide. M. Studer, however, informs me that the words on his map were intended to designate a peak, which should bear the name "Becca de la Liaz."

5. The Montagne des Cœurs, called on the map "Cœur Signal," and there placed on the south side of the Glacier de Mont Boveyre, is on the north side of that glacier, immediately above Aléve.

6. The point between Liddes and Lourtier, marked upon the map "B. d'Evasie," should be Becca de Jazie.

7. The Glacier de Valsorey descends from the north side of the Vélan, stretching farther down than the Gouille de la Vassue, which lies in the angle formed by the junction of the glaciers of Valsorey and Tzeudei.

Most of these corrections will be found to have been anticipated by Mr. Mathews in the map annexed to this volume, the only difference being in regard to the names to be given to the two highest peaks. Mr. Mathews, who has been the foremost and most successful explorer of a region hitherto strangely neglected, and whose opinion is entitled to the greatest weight, considers that the names given in the Val de Bagnes should be adhered to, and that future writers ought to conform to them.

I must observe, however, that, apart from his authority, the case rests between the people of Bagnes and the entire rest of the world; and on that issue I think it scarcely reasonable that a few illiterate peasants should prevail. In regard to the highest peak, there is nothing unusual or very inconvenient in our admitting side by side the names Grand Combin and Graffeneire; and I can see no better way of avoiding mistakes as to the second peak than by calling it, with M. Studer, Combin de Corbassière, it being well understood by those travellers who may approach it from the side of Bagnes that it is there called Grand Combin.

There is room for doubt as to the true height of this latter peak. Mr. Mathews supposes it to be no more than 12,041 English feet, that being the height given in Ziegler's Catalogue for the Petit Combin. M. Studer, on the contrary, believes that this is the point intended in that work by the second or lower peak of the Combin, and said to be 4180 metres, or 13,714 English feet, in height. The question must for the present remain unsettled, but there is strong reason to believe that this last supposition is incorrect.

CHAP. V.

FROM ZERMATT TO THE VAL D'ANNIVIERS, BY THE TRIFT PASS.

In the month of August 1857, after spending a fortnight in Chamouni and its neighbourhood, Mr. Walters and I arrived at Zermatt one glorious day, by the Col d'Erin from Evolena. We had expected grand things from a visit of some length to the Riffelberg; but, as an illustration of the peculiar uncertainty of all things among the mountains, on the next evening rain set in heavily, and on the following morning we found the ground covered with snow nearly a foot deep at the door of the house on the Riffel; on the 16th of August we were suddenly plunged into what would in England have been considered unusually severe winter weather. The snow continued falling all day, and it was impossible to see more than a few yards through the thick white mist around us; but in the afternoon some of us, being determined not to lose the whole day, made a push for the Gornergrat, the point of which, generally not much more than an hour's ascent from the Riffel Hotel, forms the centre of a magnificent panorama including all the lofty mountains of the Monte Rosa group. On the present occasion we had to work for nearly two hours through snow, often above our knees, before we succeeded in reaching the summit. Suddenly we found ourselves emerging from the snow-storm, which still pelted

GLACIER
of
ZINAL
and the
ADJOINING MOUNTAINS
Mr Hinchliff's Route
Ayer
Navrets
Pas de la Forclettaz
Grete d'Omberanza
Frilthorn
Prariong
Dufours
Turtmann Glacier
Weisshorn
Pigne de Leiod
Schalhorn
Glacier de Moming
Fluhhorn
Schallenberg Gl.
Rothhorn
Mettelhorn
Platthorn
Trifft Glacier
Ob. Gabelhorn
Gabelhorn Gl.
Unt. Gabelhorn
Arbe Gl.
Distel Gl.
Zermatt
Engraved by Edwd Weller

cruelly below, and with amazement we saw the upper regions of Monte Rosa, the Lyskamm, and the Breithorn on one side, and the Matterhorn, the Dent Blanche, and the Weisshorn on the other, standing out serenely in the clear blue sky.

An ocean of white clouds still rolled below, hiding everything less than 9000 feet above the sea; nothing solid was to be seen, except the snow-capped giants calmly ranged in their huge amphitheatre around us, laughing at the snow-storm which only beat about their hoary knees. A few minutes more, and the highest peaks were tinged with the rosy flush of sunset, the effect of which was strangely increased by their seemingly entire isolation from the cloud-robed world below; and then a wild gust of wind, dashing up the white mists into our faces and hiding the last glimpses of the glorious view, warned us to descend. By carefully following our former track in the deep snow, we found our way back in safety to the little inn on the Riffel. Those who had remained in the house had not been favoured with a moment's cessation of the thick fog and falling snow, and they could hardly believe what a splendid sight we had beheld from the summit of the Gornergrat.

Though the weather cleared partially next morning, it was evident that nothing could be done for several days, at all events upon the high mountains, so deeply had they been covered with fresh snow during the storm; we resolved, therefore, to descend the valley to Visp, cross the Simplon, sun ourselves on the Italian lakes, and return in a week to the Riffel. Our plan answered admirably, and on the seventh day, without having met with any *contre-temps* whatever, we crossed the famous Weiss Thor from

Macugnaga, and were welcomed in our mountain-quarters exactly at the time we had anticipated.

Here we had hoped to meet our friend Mr. Bradshaw Smith, who had crossed the Col du Géant with us not long before, and from whom we should not have been separated but for an attack of neuralgia, which compelled him for a while to go into retirement. Not finding him, we agreed to wait another day or two, and as the morning after our passage of the Weiss Thor was not particularly fine, we indulged ourselves in a run down to Zermatt, with the double object of looking for friends and inquiring for letters, after which we returned to the Riffel in time for an afternoon lounge.

Zacharie Cachat of Chamouni had been already nearly a month with us, during which he had always proved himself a first-rate fellow whenever anything difficult was to be done; and as we roamed about on the turf of the Riffelberg, examining with the telescope every point of interest in that most astonishing panorama, his eye rested upon the wild red crags between the Weisshorn and the Gabelhörner soaring into pinnacles above the Trift glacier, and he pointed out the place where, with Mr. Chapman, he had crossed the chain into the Einfisch Thal or Val d'Anniviers. As far as we were able to discover, this pass had only been twice crossed in modern times, though, as is frequently the case, there were legends at hand to show that in early days the peasants used frequently to cross from one valley to the other by this route. There was said to be a lost pass in this part of the chain, and in the panorama from the Gornergrat, which was published some years ago, this identical spot is marked as an ancient pass to the Einfisch Thal. From what I afterwards saw of the

way, I should be strongly tempted to doubt the truth of such statements, unless the course of centuries has entirely changed the character of the rocks on the Zinal side. Although a hunter might now and then make use of it, yet the length of the Zinal glacier, the difficulty, not to say danger, of the scramble, and the utter impossibility of ever taking any cattle or beasts of burden over the Col, incline me to class the stories of the Einfisch pass with those which pretend that in the good old times people thought nothing of crossing the glaciers from Viesch to Grindelwald for the purpose of either listening to a new preacher, or extending their commercial relations with a distant valley.

A mere mountain explorer, however, would be sure to find ample gratification in the beauty, the difficulty, and the mysterious novelty of the expedition. In the first place, it was evident that from the upper part of the Trift glacier there must be a remarkably interesting view of the Saasgrat and Monte Rosa group with the various passes to the eastward; then Cachat himself, ever of the boldest, had represented the descent to the Zinal glacier as *passablement difficile;* and, while it was admitted that scarcely any of the Zermatt guides had attempted to cross the Col, one of them was known to have returned from it with the avowed resolution of never attempting it again. Such being the allurements held out to us, what mountaineer can wonder at our yielding? With the certainty of Cachat's superintendence, we arranged to start, and waited only for the arrival of our friend.

Next afternoon his well-known brown Holland coat and straw hat were seen once more on the sunny slopes of the Riffelberg, and it was forthwith arranged that we should

all sleep at Zermatt that night, in order to be ready for the next morning. Then came the "old, old story," a difficulty about guides. Cachat of course was ready, and knowing how entirely he was to be relied upon, we did not much care who the others might be; but as we all had knapsacks, and provisions must be taken for a very long day's work which was to end in an uncivilised valley with none of the usual means of entertainment for man and beast, it was necessary that some one should go. All the Zermatt men were very shy of the undertaking, and were decidedly of opinion that its dangers and difficulties ought to be rewarded with a much larger amount of francs than we had any idea of bestowing upon them. At last Johann Zum Taugwald, who had formerly crossed the pass with Mr. Chapman and Cachat, was persuaded to go for thirty francs, and a very willing young fellow, Kronig by name, whom I had known for several years at Zermatt, agreed for ten francs to accompany us in the character of porter as far as the summit and return from that point. They all seemed to consider it a harder day's work than the ascent of Monte Rosa, and, as Taugwald would have to return by the Valais and Visp, his demand was perhaps not excessive.

The weather promised all that could be desired when we went to bed, and M. Seiler, our good host of the Monte Rosa Hotel, took great interest in the expedition. He promised to get up early to start us himself, with a comfortable breakfast, and he kept his word; but from various delays we were not fairly off till nearly half-past four o'clock, on as lovely a morning as ever was seen, while the stars were still shining brilliantly. As a special mark of favour to us, as old friends and customers, M. Seiler presented each of us with a magnificent orange, folded up in

paper, as a very rare delicacy in these remote places of the earth.

On leaving the house the first thing we did was to look towards the Matterhorn; there it stood, raising its awful head high up among the gleaming stars, streaked with long patches of snow which gave it a mysterious self-luminous appearance, and calmly looking down into the valley like some beautiful, yet fearful, phantom, folded impenetrably in its spangled robe.

Immediately behind the village we ascended towards the west by a narrow path among steeply inclined meadows, which soon led to the opening of a wild ravine, traversed by the torrent that descends from the Trift glacier to join the main stream of the Visp. Soon after entering this ravine we crossed to the south side of the Triftbach by a rude mountain bridge, consisting, as usual, of a couple of pine trees; the path soon became an indistinct track, and it was evident that the constant ravages of the furious torrent were quite sufficient to account for its deficiencies. The ascent was very steep, and the first daylight showed the valley of Zermatt already far beneath us. Presently we came to a huge shoulder of rock, which, overhanging the torrent, and seeming to cut off the path completely, threatened to bar our progress. However, we soon found that though we had come to a decidedly *mauvais pas*, it was by no means an insuperable obstacle. There were sundry small ledges, about an inch wide, on the surface of the rock, and by using one of these for the feet, and an upper one for the hands, we were not long in passing it safely. A little rather rough scrambling then led us to a comparatively level piece of country, where the vast precipices of the Gabelhörner, full in front, suffi-

ciently indicated our direction. The neighbourhood of the Triftbach is particularly rich in the flowers of the high Alps, and the silver-grey velvet heads of the *Gnaphalium leontopodium*, or Edelweiss, are much more abundant and luxuriant than I have seen them elsewhere.

We halted a few moments to ornament our hats with these, and, on turning round, were struck with admiration at suddenly seeing the splendid mass of Monte Rosa in the S.E., which, though entirely hidden from Zermatt, was now towering over the crest of the diminished Riffelberg. As we advanced the sun reddened the rocky peaks of the Gabelhörner with surpassing splendour, and after a little more easy walking we found ourselves, in one hour and thirty-five minutes after leaving the inn, upon a snug nook of green turf, with sheep-folds of stone, just where the stream bends towards the right, and here we waited for a quarter of an hour to enjoy the enchanting scene. Monte Rosa had risen higher and higher over the Riffelberg with every step we had taken, and from this point it stood up so grandly that the intervening Gornergrat seemed as nothing, excepting as a dark foil to the snowy masses of the more distant mountain. Not the faintest mist obscured its beautiful outline, and with the telescope we could make out almost every rock of the Höchste Spitze which we had so laboriously surmounted in the preceding summer. A little more to the left were the pure snow-cap of the Cima di Jazi, the small patch of rocks which marks the crest of the Weiss Thor, and the pinnacle of the Strahlhorn; thence the whole extent of the Findelen glacier swept down in a graceful curve, breaking on the rocky sides of the Riffelberg, and winding down between dark pine-forests to its termination in the white foam of the torrent. Close

to our feet the Triftbach tumbled impetuously to meet it from the opposite direction, both to be dashed into the arms of the Visp, and so hurried to the Rhone and the Mediterranean.

I wish particularly to draw attention to this very charming spot, because it is hardly ever visited, though so easily reached from Zermatt. The most moderate walker would find two hours enough for the ascent, and even if the *mauvais pas* of the rock were too difficult for some heads, yet this obstacle may be easily turned by a short climb to the left; the grass at the halting-place is deliciously fresh, and such pleasant shade is afforded by rocks on the south and west, that a pic-nic party might spend a long summer's day there with very great enjoyment. The way back to Zermatt can be varied by keeping to the high ground, instead of closely following the course of the stream. A very fine mountain-path extends for a considerable distance in this direction, from which it is not difficult to descend into the valley a little above Zermatt.

But we must be moving, for we have a long day's work before us, perhaps much longer than has been anticipated. The route to be taken still follows upward the course of the Triftbach, the Rothhorn being now nearly in front for some time, as this part of the stream is inclined to the lower part at a considerable angle. Presently we crossed the ice at the foot of the glacier in a northerly direction, and then, bending rather to the west, continued our way for a short time along a rough moraine, which was made comparatively easy to walk upon by the sharp morning frost which still firmly bound together masses of débris and ice, that a few hours later in the day would have been extremely unsteady and disagreeable. Much better footing

was obtained presently, as we began to mount a steep grassy slope, forming a kind of ridge, which appeared to have formerly been a moraine of the glacier. A large number of ptarmigan here got up around us, and would have afforded famous sport if we had been out on a shooting excursion. We took to the ice once more in a westerly direction, traversing what may be considered the second stage of elevation in the glacier; there was very little difficulty in this, and then after rather a hard scramble over masses of loose rocks and rolling stones, we halted for breakfast at a very remarkable spot, on the north side of the glacier.

We were already at a great elevation, commanding a magnificent prospect in the direction of Monte Rosa and the Saasgrat, which was particularly interesting from the fact of our having a view of the three great passes in that direction, viz., the Weiss Thor, the Adler, and the Allelein pass. The Rympfischhorn concealed the actual col of the Adler, though we could see within a few feet of it. The Trift glacier spread itself like a sea around and beneath our feet in every direction but one, where the rocky peninsula upon which we stood united itself with a wild and overhanging mass of red rock, forming a kind of promontory from the Rothhorn. The white glacier at our feet contrasted finely with this singular pile of red rock which was standing forth against the deep blue vault of heaven. We selected a spot apparently secure from the fall of such blocks as those which were scattered profusely in the neighbourhood, and prepared ourselves for quiet ease and refreshment.

Never was cold mutton sweeter; never did the good Beaujolais flow more mellifluously from the leathern cup,

for never were men in a more complete state of enjoyment and satisfaction with all around them. From this spot, moreover, we could see the exact point where we were to cross the chain, and there is always a peculiar pleasure in seeing the culminating point of a day's work coming steadily towards one's grasp. Between the Gabelhorn and Trifthorn appeared, though still far above us, a mere notch in the vast wall of snow-streaked precipices, through which we were to pass into the Val d'Anniviers.

Breakfast being over, the rope was produced, and we all got harnessed in line, for the upper plateau of the glacier, which now remained to be traversed, was evidently covered with deep fresh snow, under which might lie we knew not how many concealed crevasses. The propriety of this step was almost instantly shown, for before we got fairly off, one of the party went through the snow into a hole, which, though not deep enough to be dangerous, gave some notion of what might be expected in the thicker part of the glacier. In a course as nearly as possible straight from our resting-place to the foot of the Col, we crossed the snowy floor of the amphitheatre, whose walls of majestic precipices seemed to defy our further progress. The snow proved firmer than we had expected, and without much delay we reached the large crevasse or *bergschrund* dividing the head of the névé from the sloping walls around. Near this the snow was very deep and soft, but with a little management we contrived to cross the crevasse safely, and at once began ascending a snow-slope almost as steep as the Strahleck, and varied with patches of protruding rock not unlike those of the famous Oberland pass.

At about eleven o'clock we arrived at the highest part of our route — the notch in the rocks which we had seen from

below — and it was some little time before I recovered from the astonishment that I felt at the view which suddenly appeared before me. We were in a gap at the top of a vast irregular ridge, of which a distant view is seen in the accompanying illustration; the place on which we stood being too narrow to admit us all at once abreast, and so sharp that we could sit astride on it. The rugged side of the Trifthorn was close on our right, and a snow-capped spur from the Upper Gabelhorn was equally close on our left, while in front the rocks went down so perpendicularly from our very feet, that we could see them for only a short distance below us, and could form no idea of what they might be like a little lower down. To our left, from the northern side of the Gabelhorn, and the Pointe de Zinal, an enormous slope of ice and snow lying at an excessively steep inclination stretched down whither we knew not, for a projecting mass of rock on our right cut off the view in that direction, so as to give the idea of an unbroken and interminable sweep at a vast depth beneath us; for aught that we could see to the contrary, one might imagine that a rock hurled from the summit of the Gabelhorn would descend this fearful slope with the speed of lightning, till with one last leap it would disappear from this world into the realms of endless space. Never have I seen a more wonderful spot even among the marvels of the High Alps.

We waited a little longer on the crest to observe the magnificent view which we were now about to leave behind us. Right opposite were the Cima di Jazi and the Weiss Thor, and, as the latter seemed at exactly the same height as the place on which we stood, we all judged that we were about 12,000 feet above the sea. Cachat's bright eye

twinkled as he seemed to enjoy our evident astonishment at the situation, but the Zermatt men looked very quiet, and apparently felt a return of their apprehensions at seeing the nature of the work before them. The wind was rather keen, and stepping carefully a few paces to the right, we sat down as best we could in a nook partly sheltered by some overhanging rocks. Here Cachat found a bottle left by himself two years before in a hole which contained the card of Mr. Chapman: no other had followed; no human foot had since disturbed the sublimity of this solitude.

Each took a glass of wine and a piece of bread, while we looked at one another, wondering not a little where we were to go, for there seemed to be no possible outlet except by returning to Zermatt as we came. Presently Taugwald rose silently, taking the axe, and disappeared round the corner of the rock to the right, treading carefully on a narrow ledge, and steadying himself with his hand on a similar place above. In a few moments we heard his axe at work, and then all was silent again: young Kronig followed, and they were both absent for a few minutes longer: presently they returned together, looking serious, Cachat tossed off his glass of wine, and said, with a laugh, "Comment le trouvez-vous?" "Ah! difficile, très-difficile, presqu' impossible," was the encouraging reply. "Comment se trouve le couloir?" Taugwald replied gravely, "On ne peut pas le passer." Then Cachat disappeared with the axe, which we again heard at work, and in a few minutes he returned looking, as usual, full of confidence, and saying that, though we could not pass the *couloir*, he had found another way.

We were then securely roped together, Cachat going

first, myself next, and the others following, Taugwald being in the middle of the line, and young Kronig bringing up the rear: we had agreed to take the latter to Sierre, as he was very anxious to keep with Taugwald. One by one we crept round the corner, and in a moment saw at least some of our way before us. Close to us was the *couloir*, which, though not many yards wide, was pronounced impassable; and so it was. All who are acquainted with the high mountains know that these steep beds of ice are among the most serious difficulties they have to contend with. When, however, they consist of hard ice, they are passed by cutting deep steps for the feet; and when they are covered with plenty of firm snow, they can be crossed by treading carefully: in the present instance the *couloir*, which was frightfully steep, and stretched down farther than we could see, was covered with such a depth of loose dry snow, that no steps could be cut in the ice, while the softness of the snow made it slip down in small avalanches at every attempt to stand upon it.

Cachat now began crawling cautiously down the rocks to the left of this *couloir*, supported by us behind with the rope; we followed carefully, and a little lower down came upon a smaller *couloir* of ice, filling up a chimney-like cleft in the rock immediately below us, by which we thought we could descend. Stooping as far as possible, and held up by the rope, he cut steps which had enabled us to descend about half way, when, to our horror, the axe-handle, which had been made at Chamouni of unsound wood, broke nearly short off! Poor Cachat held up the useless weapon, shaking his head more in anger than anxiety, and we saw that another system must be adopted. Creeping down at the very edge of the *couloir*, and with

the point of my alpenstock making holes large enough to support a couple of fingers of the right hand, we passed the difficulty safely, and paused to look around us for a moment.

The vast slopes of unsullied whiteness on our left, terminated in the bed of the Zinal glacier, now right before us, but apparently at a hopeless distance below, considering the nature of the ground we had to traverse. If any reader has enjoyed the sea breeze from the edge of the cliffs of Beachy Head, he will not forget the effect; and if he will fancy the cliffs four or five times as high, but of rock instead of chalk, with the ocean below changed into a field of ice and snow, and slanting downwards very steeply towards Newhaven, he will have a very good notion of the western side of the Trift pass.

The rocks were irregular, and intersected with vertical clefts and openings, by which we continually directed our descent, in the most difficult places lowering the first man cautiously by way of experiment. This downward scramble occupied three hours, and during the whole time I never looked up over my shoulder without seeing the rest of the party curiously foreshortened, and apparently meditating an immediate descent on my head. Of course the greatest possible care was necessary at almost every step, and the danger was considerably increased by the clumsiness of young Kronig, who, in spite of constant warnings, contrived to upset all the loose stones near him, and send them rattling about the ears of the party below: this brought considerable abuse on him, as may well be imagined, and now and then every head was turned simultaneously up towards him with loud and lively anathemas. We could never see far down the rocks, in consequence of their

excessive steepness, excepting when, as sometimes happened, we could make out the top of some projecting knob or buttress, for which we might steer, and generally after arriving there it was somewhat a matter of doubt whether we should be able to pass the next stage of the descent in the same fashion, the difficulty being frequently increased by snow and ice filling up the only clefts where we could pass at all.

Patience and perseverance, however, met with their usual reward. The great slope from the Gabelhorn, which had so long appeared beyond our reach, was at last near enough to enable us to judge of the state of its surface; and, being thoroughly tired of the rocks, we resolved as soon as possible to get upon the ice, where it swept the base of the precipices. The surface, however, was furrowed by parallel channels of various magnitudes, some several feet in depth, formed originally by the descent of stones and avalanches from the heights; and we found one of these trough-like furrows skirting the base of the rocks we stood upon. One by one we entered, flattering ourselves that the covering of snow would afford us pretty good footing, but this soon failed; the hard blue ice showed on the surface, and we found ourselves rather in a difficulty, for the sides of our furrow were higher here than at the point where we entered it, and so overhanging that it was impossible to get out.

Delay was dangerous, for the débris far below warned us that at any moment a shower of stones might come flying down our channel; a glissade was equally dangerous; for, though we might have shot down safely at an immense speed for some hundreds of feet, we should finally have been dashed into a sea of crevasses. Cachat in front

solved the puzzle, and showed us how, by straddling with the feet as far apart as possible, the heel of each foot could find pretty firm hold in a mixture of half snow and half ice, his broad back, like a solid rock, being ready to check any slip of those behind him. Some little way down, this difficult *cheminée* of ice expanded right and left, and we emerged on a fine slope of moderately inclined snow of the proper consistency for a glissade. So away we went in a row, standing upright and sliding in true mountaineer fashion; but, as we were still roped together, much amusement was created by the difficulty of keeping the pace uniform to avoid upsetting one another by going too fast or too slowly. A few minutes of this sort of work takes one over a great deal of ground, and we were soon safe upon a fine open plateau of the névé, where we threaded our way among a few snow crevasses requiring caution, and then prepared for a comfortable halt in an apparently safe place.

The continuous exertion and great excitement of the three hours and a half since leaving the Col were admirably calculated to put the whole party in a high state of satisfaction at coming to so smooth an anchorage, and in the highest spirits we prepared to improve the occasion to the uttermost. The provision knapsacks were emptied and used as seats; bottles of red wine were stuck upright in the snow; a goodly leg of cold mutton on its sheet of paper formed the centre, garnished with hard eggs and bread and cheese, round which we ranged ourselves in a circle. High festival was held under the deep blue heavens, and now and then, as we looked up at the wondrous wall of rocks which we had descended, we congratulated ourselves on the victory with a quiet nod, indicative

of satisfaction. M. Seiler's beautiful oranges supplied the rare luxury of a dessert, and we were just in the full enjoyment of the delicacy when a booming sound, like the discharge of a gun far over our heads, made us all at once glance upwards to the top of the Trifthorn. Close to its craggy summit hung a cloud of dust, like dirty smoke, and in a few seconds another and a larger one burst forth several hundred feet lower. A glance through the telescope showed that a fall of rocks had commenced, and the fragments were leaping down from ledge to ledge in a series of cascades. Each block dashed off others at every point of contact, and the uproar became tremendous; thousands of fragments making every variety of noise according to their size, and producing the effect of a fire of musketry and artillery combined, thundered downwards from so great a height that we waited anxiously for some considerable time to see them reach the snow-field below. As nearly as we could estimate the distance, we were 500 yards from the base of the rocks, so we thought that, come what might, we were in a tolerably secure position. At last we saw many of the blocks plunge into the snow after taking their last fearful leap; presently much larger fragments followed, taking proportionably larger bounds; the noise grew fiercer and fiercer, and huge blocks began to fall so near to us that we jumped to our feet, preparing to dodge them to the best of our ability. "Look out!" cried some one, and we opened out right and left at the approach of a monster, evidently weighing many hundred-weight, which was coming right at us like a huge shell fired from a mortar. It fell with a heavy thud not more than twenty feet from us, scattering lumps of snow into the circle where we had just been dining; but scarcely had we begun

to recover from our astonishment when a still larger rock flew exactly over our heads to a distance of 200 yards beyond us. The malice of the Trifthorn now seemed to have done its worst; a few more blocks dropped around us, and then after an incessant fire for about ten minutes, the falling masses retired in regular gradation till nothing remained *in transitu* but showers of stones and small débris pouring down the side of the mountain; the thundering noise died away into a tinkling clatter; and, though clouds of dust still obscured the precipice, silence was soon restored.

We resumed our seats on the knapsacks now bespattered with snow, and lighted the pipe of tranquillity, all agreeing that we had never before seen such a sight, and wondering at the force which could project such masses for six or seven hundred yards through the air at a single bound. Even Cachat looked somewhat bewildered, and with a most comical expression of face he exclaimed, "Ah! si ma femme pouvait savoir où je suis à présent! Je lui ai dit en partant de Chamouni que j'allais voyager avec des messieurs qui étaient les plus tranquilles du monde, et—me voici!" The fact was that the fall had taken place too near to the line of our descent for the remembrance of it to be altogether pleasant.

But now our difficulties were nearly over; we had to thread our way cautiously among a few more large crevasses with beautiful wreaths of snow overhanging them, and, a little lower, we emerged upon the firm ice of the Zinal glacier, leaving close on our left the vast remains of snow avalanches which had lately descended from the northern spurs of the Dent Blanche. Freed from the restriction of the rope, we moved rapidly in a north-

westerly direction towards the only outlet from the vast amphitheatre of lofty mountains, through which the glacier makes its way towards the great valley of the Rhone. Round the shoulder of the Besso, or Bêche, the glacier sweeps more to the north, and, in a very steep descent at this part, it is so torn by crevasses as to be impassable; it is therefore necessary to keep close to the base of the latter mountain, and presently the ice must be altogether abandoned for the moraine on the right. As we descended by this, we saw an old chamois and her young one among the loose blocks below, at the distance of about eighty yards; we surprised them by appearing suddenly on the top of a small eminence which had hidden us before; they looked at us steadily till the guides raising their usual shout startled them into flight. They went off like the wind, and disappeared for a while beneath the rocks, but in a few moments we saw them on the glacier, jumping the crevasses in splendid style, side by side, the little one constantly looking up to the anxious mother, and seeming to say, "Here I am, mother; get along, I'm all right."

As soon as the glacier appeared practicable, we again took to the ice, and by keeping pretty close to its right bank, made excellent progress till we came to a remarkable situation. In a manner which I have never elsewhere remarked upon a regular glacier, the surface of the ice was inclined at a dip of about 30°, as if a smooth sheet of water tumbling over a weir had been suddenly grasped by the iron hand of frost. The nature of the crevasses on the left forbade all progress in that direction, and this singular slope extended to the right as far as the east side of the glacier, where it was cut off from terra firma by an impassable chasm. Cachat and I went as far as we could to

the left, where the descent was not more than twenty or thirty feet; the others made for the right, where, though the descent was more than doubled, the ice seemed much rougher, and consequently safer for the feet. Seeing that there was no particular danger at the bottom, I followed Cachat in a slide down, checking the speed as much as possible by leaning our whole weight on the point of the alpenstocks behind our feet. In an instant we were safe at the bottom, but on looking round we saw that the rest of the party were in a considerable difficulty; they had begun to descend cautiously, but finding the ice smoother than they had expected, they just managed to stand still, without being able to move either up or down.

Cachat, though a first-rate hand on ice, made two ineffectual attempts to climb up to them, and each time came flying down the slope again to where I was standing, for no steps could he cut, our axe being *hors de combat*. At length he contrived, with admirable skill, to reach them by going more to the left; he helped them down the most difficult part, after which we were soon re-united safely at the bottom.

After this, it was all plain sailing, though the length of the glacier was much greater than we had expected. We had no difficulty in going right down the middle of it for several miles, and met no more crevasses worthy of notice. We then made for a point on the west side of the glacier, fancying we could see traces of a path among the rough herbage. At the lateral moraine we halted a few minutes and indulged ourselves with a glass of wine all round, but the day was too far advanced for us to wait long. Leaving the glacier on our right, we walked for about ten minutes over rough grass and small shrubs, till our progress was

barred by an impassable precipice in front, and we were again compelled to descend to the moraine. Close to this point the glacier stream issues in a powerful torrent through a huge cavern from under the ice, where it has held its secret course; and after running about a quarter of a mile close by the side of a glacier, it takes a sudden turn to the right, and apparently disliking the glare of daylight, thunders down again into a vast abyss of the ice, whence it continues its subglacial course, till once more it emerges, far below, at the very foot of the glacier.

The Arpitetta formed a grand and picturesque object on our right, at the south side of which we hoped to see some means of arriving at the Weisshorn, whose glorious pinnacle has never yet felt the foot of man; but we soon found that though there was a very fine view up the ravine leading towards its summit, it would require time for a separate expedition, if we would mount high enough to see any approach to the haughty giant.

A little lower we fairly passed the foot of the great Zinal glacier, and gradually came to a tolerably good path which soon led us to fine pastures, the ground was once more bright with flowers, the cattle-bells tinkled around us and above; and we were evidently approaching comparative civilisation and the summer abodes of mankind.

I am indebted to a friend for the sketch from which the annexed wood-cut is taken. Looking up the Glacier of Zinal, the remarkable peak of Lo Besso is seen in the centre, and on the left are the steep rocks forming the base of the Arpitetta.

The scanty allusions to the Val d'Erin and the Val d'Anniviers, or Einfisch Thal, describe them as inhabited by rude and obstinate barbarians, and we knew that we

could not expect a regular inn, even of the poorest kind, anywhere in the valley; but we understood from Taugwald that in the village of Ayer we might find a châlet sometimes devoted to the accommodation of a stray cattle-dealer.

LO BESSO, FROM THE CHALETS OF ZINAL.

It was almost the only day I can remember on the mountains, when not the smallest cloud or mist had marred the deep blue sky from sunrise till evening, but the valley is so completely shut in by lofty eminences, that darkness came upon us very soon after sunset, about which time we arrived at the upper châlets of Zinal. We were very naturally curious to see what kind of entertainment awaited us in the valley, and we were no less pleased than surprised to find lounging about at the doors of these rude

habitations, several groups of men, whose bright intelligent faces showed them to be of a very superior description to those generally found in the remote pastures.

They greeted us pleasantly in good French, expressing undisguised astonishment at finding that we had left Zermatt in the morning. "Ma foi! avez-vous donc passé les montagnes?" was the universal question, followed by the commentary of: "Mais, c'est très difficile, n'est-ce pas?" Their manners were so unusually frank and civilised, that we concluded they were superior cattle-owners who had only come up the valley for the summer season, and we afterwards had good reason to repent not having halted with them for the night, instead of pushing on to Ayer.

"Forward!" however, was the word; and not feeling very sure how much further we had to go, we walked on at full speed down the valley. The path is good enough, but it was past eight o'clock and quite dark, when we reached the village. Not a light was to be seen among the black old-fashioned châlets, so the guides began shouting under the windows, in the hope of arousing some sleepy peasant. At last, a man's head appeared through an upper window, and, in a vile *patois*, he told us that the house we wanted was at the other end of the place.

After much wandering about in the dark, we managed to stumble upon it, and in reply to more shouting an old woman came to the door with a light. The apparition of six men seemed not a little startling to the good soul, but she let us all in to what appeared to be the only available apartment, and a singular place it was. In one corner of the gloomy room was a bed, out of which the old lady had just tumbled, and which she informed us that she occupied in joint tenancy with her niece. In the middle of the floor

was a small mattress, from which she had stirred up a young shepherd, who was rubbing his eyes at the unwonted disturbance; and in the opposite corner to her own was a tolerably large bed, which we soon found was the only accommodation for travellers in the village of Ayer.

After some discussion, it was arranged that young Corydon should turn out and sleep in the hay-loft with our guides, while we were to make the best we could of the interior. The next point was, if possible, to get some supper: our own provisions were all exhausted excepting a piece of cheese, and we were horrified to find that the eatables of the establishment amounted as nearly as could be to that "jolly, jolly nothing" of the nursery song. There was, however, a goodly supply of the refreshing Muscat wine of the Valais, which served to wash down sundry hunches of bread, which, in colour and consistency, resembled dirty brickbats.

The niece slept profoundly while our hostess busied herself in bringing up fresh supplies of wine, and we exerted ourselves to the utmost under the circumstances to refresh the inner man. In this valley, as we had also observed at Evolena, undressing seems to be considered quite a work of supererogation on the part of the peasantry, and when our guides, conducted by the shepherd, had sought the retirement of their hay-loft, the old lady turned into bed again as she was, leaving us to take care of ourselves. Bradshaw Smith took possession of Corydon's mattress, while Walters and I, aided by an old oak settle, climbed to the top of the large bed. He took the inside, and I, slipping off my coat, reposed on the exterior from fear of the heat of the room.

As I expected, the heat was so stifling that sleep was

almost impossible; and looking about me by the dim light of a tiny lamp hung from the ceiling, I saw poor Smith sitting up in his bed, and execrating the most agile and evasive of insects. I could not help laughing, and the old lady, disturbed by our conversation, again turned out to see what was the matter. She seemed highly amused with the explanation, and became rather garrulous withal, so we persuaded her to take a drop of the "gude brandie" which still remained in one of our flasks. She pronounced it admirable, and soon after retired finally to her couch, where she slept the sleep of innocence—so soundly, that beyond her snoring we heard nothing more of her till morning.

Half suffocated with the closeness, we went out before five o'clock, and had a refreshing wash in a long trough of clear spring-water outside the house; the guides followed our example, and then we breakfasted on more white wine and bread.

An offer of ten francs for the party called down all imaginable blessings on our heads, and at six o'clock we bade a most friendly adieu to the comical old spinster of Ayer.

From this village a mountain-path to the right leads over the Forcletta pass to the head of the Turtman valley; and another route to the left leads up the Val de Torrent to the glacier of the same name. We, however, made straight for Sierre, through some of the most perfect valley scenery in all Switzerland. About an hour below Ayer is Vissoye, which, though a very humble village, may, I suppose, be considered the capital of the Val d'Anniviers; and to any one who may wish to follow us over this pass, I would suggest the propriety of starting two hours earlier than we

did, so as to reach Vissoye before night. One of the most striking features of this valley is the variety of villages perched up at an immense height on the sides of the adjacent mountains: and some of these may be the places where report says that all the members of each family feed out of separate holes, made in a single block of timber, in which they collect all the eatables they can find, to be devoured when it so pleases them.

The valley is rich in cattle, and the inhabitants have constructed a capital road along the east side of the river. The old path must have been bad enough, but the new one is admirably contrived so as to keep a pretty regular gradient by means of tunnels blasted through the magnificent rocks. Far below is the base of the valley, clothed on both sides with rich and varied wood, through which the torrent leaps and roars down to the Rhone, ever ready to embrace its mountain-children; and rising high into the sky beyond shine the mountains of the central chain of Switzerland.

We reached the comfortable inn at Sierre in about four hours from Ayer, having improved our breakfast as we walked along with some delicious rough yellow gooseberries, which grow in great abundance by the road-side near Vissoye, and which can be most safely recommended to all who may hereafter pass that way.

Those who travel along the high road of the Valais, without thinking of stopping till the carriage brings them to the many-towered Brieg at the foot of the Simplon, would be amply repaid by spending a night in clean and comfortable quarters at Sierre, and thence walking or taking mules to Ayer and back, with sufficient provisions for a pic-nic in the meadows. Those who admire exquisite

scenery, with all the additional charm of novelty, and without the fatigue and trouble incident to travelling over the High Alps, could find very few more delightful opportunities of indulging their taste than a day in the unfrequented Val d'Anniviers.

THOMAS W. HINCHLIFF.

NOTE BY THE EDITOR.

I can confirm Mr. Hinchliff's observation as to the untrustworthy character of the traditions respecting passes said to have been formerly frequented, that still linger in many parts of the Alps. In 1845 I made many inquiries about the possibility of crossing from Zermatt into the Einfisch Thal. I was told that a pass in that direction had once existed between the Weisshorn and the Rothhorn; that a former Pfarrherr of Täsch had found papers 400 years old, in which that was spoken of as a customary pass; but that about the beginning of this century it had become impracticable, owing to the accumulation of ice at the summit of the ridge overhanging the rocks by which the descent was effected. Some enterprising traveller may be induced to explore this portion of the chain, and may possibly be able to descend by the Glacier de Durand, otherwise called Glacier de Moming, to the south-east of the Arpitetta Alp.

The Trift Pass, exactly in the position described by Mr. Hinchliff, was pointed out to me as the way formerly taken from Zermatt into the Eringer Thal, and the maps published up to 1845 did not enable me to recognise the absurdity involved in such an assertion. It was added that beasts of burden had passed that way, and, as a confirmation of the story, I was told that a hunter, many years before, had picked up a horse-shoe on rocks above the Trift Glacier. The utmost that can be inferred in such cases is, that at some former time a passage had been effected, all the rest is mythical.

Though decidedly more difficult than the Weiss Thor, the height of the Trift Pass cannot be so great. The old Weiss Thor Pass, between the Cima di Jazi and the Nord End, was found by Schlagintweit to be 3618 metres, or 11,870 English feet above the sea level, and the pass now used on the north side of the Cima di Jazi is about 270 feet higher. But the Trifthorn immediately overhanging the Trift Pass is said by Ziegler to be not more than 3651 metres, or 11,978 English feet in height, and the pass must be five or six hundred feet lower.

The excursion up the Trift as far as the foot of the glacier is one of the most interesting to the naturalist, as well as to the lover of wild scenery, that can be made even from Zermatt. At the foot of the rocks, immediately behind the village, he will be struck by the remarkable association of plants that have descended from the Alpine region, with many species of the hot valley of the Rhone that have ascended the sheltered valley of St. Nicholas as far as Zermatt. Here, at an elevation of 5500 English feet, may be seen the long feathery awns of that beautiful grass, *Stipa pennata*, growing within a few feet of *Gnaphalium leontopodium*, generally regarded as a plant of the upper Alpine region. A little higher, at the opening of the gorge of the Trift Bach, other species still more decidedly Alpine in character may be found, such as *Artemisia mutellina*, *Avena distichophylla*, *Carex bicolor*, &c. &c.

The expectation of effecting the ascent of the Weisshorn from the west side, expressed by Mr. Hinchliff, is, I think, not likely to be gratified. There is a magnificent view of that mountain and the adjoining range from the Arpitetta Alp, above the foot of the glacier of Zinal. The whole scene bears some resemblance to that which is presented by the range of Monte Rosa, as viewed from the Macugnaga glacier, and for grandeur and sublimity may rank next after that unequalled panorama. The most favourable side for attempting the ascent of the Weisshorn, is probably that of the Schallenberg glacier, the torrent from which joins the Visp between Täsch and Randa.

I may here suggest that another passage might most probably

be made from Zermatt to the Einfisch Thal between the Gabelhorn and the Pointe de Zinal. Examined through a glass from the Arpitetta Alp, it appeared to me that the Zinal glacier in that direction presents no serious difficulty.

An attempt to reconnoitre the south side of the same pass, which would probably lie over the Arbe glacier of the accompanying map, was defeated by bad weather.

The subjoined sketch was taken from Luc in the Einfisch Thal, and shows the peak of the Matterhorn, towering behind the supposed pass at a distance of twenty miles.

THE MATTERHORN, FROM THE VILLAGE OF LUC.

The worthy *curé* of Vissoye used to receive the few travellers that appeared in the Einfisch Thal, and his house afforded the only comfortable quarters in that rarely visited valley. The châlets of Zinal near the foot of the glacier are *mayens*, inhabited only for a portion of the early summer and the autumn.

Engraved by Edwd Weller

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CHAP. VI.

ZERMATT IN 1845.

PASS OF THE SCHWARZ THOR.—ZERMATT TO AYAS.

SEVERAL years ago, in 1845, I passed some time at Zermatt chiefly engaged in the double task of exploring the remarkable vegetation of the valley of St. Nicholas, and observing the movement of the two nearest glaciers—those of Gorner and Findelen.

The glacier observations, which cost an amount of labour disproportioned to their apparent value, were chiefly directed to verify the law of glacier motion then recently announced by Professor Forbes, the accuracy of which, though now universally admitted, was for some time disputed by several continental writers. Beyond a confirmation of the general rule, that the onward motion of the ice is retarded as we pass from the central part towards the side of a glacier, and proof that this retardation is as manifest in the lower steep and crevassed portion of the Gorner Glacier, where the daily rate of progress, in summer, exceeds a foot, as in the level portion of the slow-moving Findelen Glacier, that advances no faster than two inches in twenty-four hours the only interesting fact that I noticed, was the indication of a double current in the latter glacier, with an intervening portion near the centre, that advanced rather more slowly than those on either side. Such an exception to the regular increase in the rapidity of the ice-current in passing from

the sides to the centre, is doubtless due to some peculiarity in the form of the bed of the glacier. A rock rising in the middle of the current would divide it, just as it does in water.

A more difficult problem is presented, by the recent history of the two glaciers upon which my work lay in 1845. They both arise from the great field of névé, that stretches from the rocks of the Nord End of Monte Rosa, for four or five miles to the foot of the Strahlhorn. From that plateau, whose mean elevation is notless than 11,000 English feet, extends to the westward a projecting ridge, that terminates in the Riffelberg, near Zermatt. On the north and south sides of this ridge are the valleys which contain the Findelen and Gorner Glaciers, that drain the upper reservoir of snow. The first receives in its course no considerable affluent. To the Gorner, on the contrary, are poured in, one after the other, six glaciers proceeding from the northern side of the main chain, between the Nord End of Monte Rosa and the Petit Mont Cervin. The fact to be explained, is the continued increase of the Gorner Glacier, simultaneously with a nearly equal degree of waste in that of Findelen. For thirty or forty years, at least, the Gorner has steadily advanced into the valley of Zermatt, while during a great part of the same time, its companion has been retiring up the tributary valley below the châlets of Findelen, and has left a bare space, from whence the ice had stripped away the soil and its vegetation. The most natural conjecture, in this and other similar cases, is to assume that by some local change, such as the gradual abrasion, or sudden disruption, of a barrier of rock, a part of the ice proceeding from the basin drained by the two glaciers, which formerly flowed into the one channel, has since been diverted into

the other. A nearer view of the localities does not, however, in the case here discussed, favour that supposition; it is, indeed, true that there is no such dividing ridge as is indicated in Schlagintweit's map between the Stockhorn and the Cima di Jazi, defining the precise limits of the area drained by each glacier; but, on the other hand, the form of the plateau makes it hard to conceive that any probable amount of change in the rocks beneath, or surrounding it, could have materially influenced the direction in which the accumulated ice and névé would seek an outlet; the indications of such a change, if anywhere traceable, should be sought in the neighbourhood of the Stockhorn.

Starting from the supposition that there has been a slow and gradual increase of snow in the upper regions of the Alps—a conclusion which is certainly in accordance with general tradition and documentary evidence, and which, as I have sought to show elsewhere*, is not inconsistent with the admitted principles of physics,—another and different explanation of the above-mentioned difficulty has occurred to me. Perhaps I shall be excused for stating it here. Glacier ice, especially in the upper region where it is but imperfectly consolidated, requires a vast amount of pressure to cause it to flow in a channel of moderate inclination; spread over a sloping plain of irregular surface, it would, in the first place, seek an exit in the direction of least resistance, and the outflow would take place in that direction only, even though openings should offer themselves in the irregular surface, through which, if the ice were a freely moving fluid, it would escape in other directions; but if the thickness of the stratum of névé were continually to increase, the pressure on the

* Philosophical Magazine for 1855, vol. ix. 4th Series.

lower portion would at length reach such a point as would cause a new outflow to take place in the direction of *next least resistance*, and the immediate result would be, to diminish the pressure operating in the channel through which the entire of the drainage had previously passed.

To give an illustration, familiar to many Alpine travellers.—A great and gradual increase in the quantity of névé and ice on the Aletsch Glacier would, of course, cause the lower end of the glacier to advance continuously down the gorge, through which its stream flows into the valley of the Rhone. If the accumulation went on until, in the upper basin of the glacier, the névé attained the height of the col leading into the Lötsch Thal, the ice would still be poured down through the present channel*, and the end of the glacier would continue to advance; but as fresh névé and ice became piled up above the Lötsch Sattel, the pressure would at length be sufficient to cause an outflow in that direction. This would go to increase the Lötsch Glacier, which would advance more rapidly than usual, while on the Aletsch the first result would be to diminish the supply, and with it the velocity of the stream: the melting below would proceed faster than the diminished flow of the ice-current, and the lower end of the glacier would retrograde. In other words, the phenomena actually seen in the Findelen and Gorner Glaciers would be exactly reproduced.

During my stay at Zermatt, I made many inquiries as to passes communicating between the valley of St. Nicholas and the adjoining valleys in every direction. The infor-

* I say nothing of the lateral opening at the Märjelen See.

mation that I was able to gain from the older guides, Damatter, J. B. Brantschen, and an old hunter of Täsch, was vague and unsatisfactory to a degree that would surprise those who do not know how amazingly our knowledge of this part of the Alps has been increased since 1845.

Excepting the established pass of St. Théodule, the only one that was admitted to be certainly practicable, was that of the Col d'Erin, accomplished by Professor Forbes in 1842; and occasionally, though at long intervals, by preceding travellers. Of the Trift Pass, described in the last chapter, there was but a spurious and baseless tradition. Doubts were expressed even as to the possibility of passing from St. Nicholas into the Turtmanthal; these I had the satisfaction of solving in the course of an excursion, in which I also visited the then almost unknown Einfisch Thal or Val d'Anniviers.

Of the passage of the Saas Grat I could obtain no certain information. It was certain that some hunters had passed from Saas to Täsch, and the danger and difficulty were said to be extreme; a party of Englishmen who made the attempt were said to have passed the night on the ice and to have been laid up at Täsch on their unsuccessful return. The Adler Pass had not at that time, I believe, been discovered.

My repeated inquiries as to the Weiss Thor, produced no more information than was obtained three years before by Professor Forbes. Damatter, who had certainly passed it several years before, declared that the ice had accumulated on the Zermatt side, so as to overhang the precipitous rocks by which the descent had been made to Macugnaga. It was reported, however, that a dare-devil hunter, "*Bi er*

Jäger," had found out a new way over the ridge, but kept it a secret.

This story of the old pass having become impracticable through overhanging ice, has been repeated to me at each of four visits made to Zermatt, yet M. Adolphe Schlagintweit made the passage successfully in 1851, in company with one of the Taugwalds. It is true that Lochmatter, who is the best guide at Macugnaga, and with whom I passed the New Weiss Thor in 1856, positively denies the possibility of descending by the old route. This testimony notwithstanding, it seems to me desirable that some one should make the attempt. Being considerably nearer to the stupendous eastern face of Monte Rosa, the scenery must be even grander than that of the new pass. This, which lies on the north side of the Cima di Jazi, exactly at the point where the main ridge of the Pennine Alps divides into two branches—a northern one which includes the Strahlhorn and the Mischabel Hörner, dividing the valleys of Zermatt and Saas, and an eastern one which is the dividing ridge separating Switzerland from Piedmont—is said to have been first accomplished by Professor Ulrich in 1852; but, as the story current seven years before would seem to show, it may have been previously known to some chamois hunters. By the north-eastern angle, it is possible to descend over the Schwarzberg Glacier into the valley of Saas, while the descent to the south-east, down 6000 feet of precipitous rocks, leads the traveller into the unequalled scenery of the gigantic amphitheatre that encloses the Glacier of Macugnaga.

I have been led to say so much because erroneous impressions are still afloat among well-informed persons who are not personally acquainted with this famous pass,

and I may take the occasion to correct a false impression which has become common through a singular mistake in the map published by the Messrs. Schlagintweit. When this part of the chain of the Pennine Alps was imperfectly known, and the names of peaks still unsettled, the name Cima de Jazi, by which the people of Macugnaga designate the highest point visible from that place in the ridge running northward from Monte Rosa, was supposed to belong to the remarkable peak of the Strahlhorn, at the upper end of the Findelen Glacier, which is everywhere seen from the high ground above Zermatt. Canon Berchtold of Sion, who measured trigonometrically the heights of the chief peaks in this part of the chain of the Alps, determined the height of the Strahlhorn to be exactly 4300 mètres, equal to 14,108 English feet, or sixty-six feet higher than the Finsteraar Horn. That this great elevation should be attributed to the Cima de Jazi by those who confounded the latter with the Strahlhorn is not surprising; but it is hard to understand how the Schlagintweits, who were so familiar with this district, and who have correctly distinguished in their map the comparatively insignificant Cima de Jazi from the towering peak of the Strahlhorn, should have attributed to the first the height that belongs to the second. The Cima de Jazi is now often ascended from the Riffel; and when the snow is in good order, the excursion is no more than a very easy day's walk. The exact height of the Old Weiss Thor, according to Schlagintweit, is 11,870 English feet, and that of the new pass is 266 feet more, or 12,136 feet. The Cima de Jazi is not above 500 or 600 feet higher, or about 12,700. I know of no point in Europe nearly so elevated, that can be reached with so little labour or difficulty.

The main object of my inquiries, in 1845, was to ascertain the possibility of effecting the passage of the chain of Monte Rosa somewhere between the Höchste Spitz and the Breithorn, and thus establishing a direct communication between Zermatt and Gressonay. Of information on this point there was none to be had at Zermatt, beyond a vague story that fifty or sixty years before some people had arrived from Gressonay across the glaciers of Monte Rosa. Frequent and prolonged examination of the range, as seen from the Riffelhorn and the Gorner Grat, satisfied me that there were but two routes by which the passage could be attempted. The first of these would lie between the Zumstein Spitz and the summit of the Lys Kamm, ascending from the Gorner Glacier by the rocks called Auf der Platte, and following the course of the great tributary glacier that descends from the highest plateau of the Rosa. By taking this course one great advantage would be secured: having once reached the plateau, there could be no doubt as to the possibility of descending on the southern side by the same way which Zumstein had followed in his numerous attempts to reach the summit of Monte Rosa. The objection, which at that time with my limited experience of the higher region appeared formidable, was the great distance to be traversed, and the risk of being benighted before effecting the descent to the lower part of the Lys Glacier. According to Zumstein's barometer observations, the height of the plateau between the Lys Kamm and the Zumstein Spitz is 14,156* English feet, and M. Gnifetti, the curé of Alagna, who traversed it in his ascent of the Signal Kuppe, estimates its breadth at 2,000 paces, or more than a mile; the ascent is gradual and long,

* This determination is, perhaps, somewhat too high.

and there would be no chance of accomplishing it, even by passing the night at the exposed rocks of Auf der Platte, before the sun had softened the snow over the greater part of the distance. I had no desire to be driven to take refuge for the night in a crevasse, as happened to the intrepid Zumstein in one of his ascents, and I therefore rejected this route.

The alternative course that presented itself lay between the western end of the Breithorn and the two conical eminences of about equal height called the twins (Zwillinge), or, of late years, by the more fanciful names, Castor and Pollux. From the Gorner Grat, or, better still, from the less conveniently accessible Hochthäligrat, is seen a glacier much crevassed in its middle region that descends from this part of the chain, joining the Gorner Glacier between the rocks which are named on the map Schwärzeberg and Oberes Triftli. On the south-west, this, which is called the Glacier of Schwärze, is bounded by the dark precipitous rocks of the Breithorn, that bear upon their summit a long nearly level ice-terrace, but very little lower than the highest point of that mountain. At the base of these precipices the glacier falls rapidly in a giant staircase carried along their face, of which each step is separated from the next by impassable crevasses. To the left, from above the rocks of the Schwärzeberg, descends another portion of the glacier broken up into those huge blocks of ice and névé which Saussure called *séracs*, and below these a range of crevasses seemingly as impassable as the first. The latter system of crevasses was, however, inclined at a considerable angle to the others, and on careful examination I was able to trace, where the two systems intersected, a succession of snow bridges, by which the ascent might be continued for some distance. Above this it was impossible to trace the

way accurately. Enormous ice-cliffs seemed to have fallen together, and though they did not look hopeless, I could not be certain that a way would be found through them. These once surmounted, however, there could be no doubt about reaching the summit of the pass.

The essential point remained still to be decided, whether a practicable descent would be found on the south side of the ridge. Trusting to the very uncertain recollection of a view from the summit of the Grauenhaupt* over Gressonay, which I had ascended five years before, I persuaded myself that a glacier descended from the Zwillinge towards the south-east, by which it would be practicable to reach the head of the Val de Lys. On speaking of the project to some of the people at Zermatt, I found more interest shown than was usual among that rather phlegmatic population. There was an evident wish to encourage the attempt, and several affirmed that it was certainly by that part of the ridge that the mythical "men of Gressonay" had effected the passage.

The next point was to secure a companion in the undertaking. It is an indefensible piece of rashness to travel alone in the upper region of the glaciers; no amount of skill and experience can avert the almost certain consequences of the yielding of the snow coating that covers over a concealed crevasse. But I have always thought that two practised mountaineers may safely undertake any expedition, and that they are just as likely to succeed as a larger number. A traveller prepared by previous experience, who is ready to take his full share of the work,

* The Grauenhaupt is the highest point in the range that divides the Val de Lys from the valley of Ayas, and about 10,800 feet above the sea-level. The ascent is in great part a steep scramble, but the view is magnificent, corresponding in some measure with that from the Cramont.

both in carrying baggage, cutting steps, and making the track through the snow, has no occasion to take more than a single guide, and all additional assistance is rather a matter of luxury than necessity. I was somewhat disconcerted when I found that J. B. Brantschen, an elderly and slow, but steady and safe man, who had been my assistant for the preceding two or three weeks, was unwilling to start, and I rather reluctantly engaged a younger and stronger man named Mathias Tangwald, but not, as I believe, the same who has since acquired a good reputation as a guide. My new friend was introduced as one of the best chamois hunters in the valley, but his countenance was heavy, and denoted neither energy nor enterprise.

Our arrangements were soon made: my baggage, including a large package of dried plants, was forwarded by Visp and the Simplon to Baveno, but, instead of emulating some of my friends who dispense with personal baggage in their Alpine expeditions, I adhered to the ancient practice of carrying with me a moderate supply of linen and other comforts. As I meant to carry my knapsack myself, I had no occasion unduly to stint myself. Perhaps I may mention a few articles which long experience has made me retain, after rejecting others that I have found less useful. Foremost I place a knitted woollen waistcoat with sleeves, such as the country people wear in many parts of France; it is invaluable when a night has to be passed in cold or damp quarters after a hard day's walk. A few very small tin canisters are the best means of carrying a slight provision of tea, chocolate, and raisins. A one-volume Shakspeare is a safe resource for a wet day. I plead guilty to one or two other luxuries, including slippers to rest the feet after long walking. To my knapsack is strapped a

stout piece of rope about thirty feet long, with a Scotch plaid and umbrella; the last, though often scoffed at, is an article that hot sunshine, even more than rain, has taught me to appreciate. A couple of thermometers, a pocket klinometer, and a Kater's compass with prismatic eye-piece, may be carried in suitable pockets, along with a note-book and a sketch-book, having a fold for writing paper, &c.; a good opera-glass, which I find more readily available than a telescope; strong knife, measuring tape, a veil, and spectacles, leather cup, spare cord, and matches. A flask with strong cold tea, to be diluted with water or snow, a tin box for plants, a geological hammer, of a form available for occasional use as an ice axe, with a strap to keep all tight, and prevent anything from swinging loosely in awkward places, complete the accoutrement.

Mathias was to carry the provisions, which included a small wooden keg of wine for his own use, and in addition a light portable apparatus for boiling water, along with three pieces of iron made to fit two long and solid alpen-stocks, so as to convert them into a temporary ladder or bridge. The last, however, I have not found of much practical use, except now and then to enable me to reach plants on steep walls of rock.

After a substantial early dinner, provided by the worthy Mme. Lauber, whose name is fresh in the memory of all the early visitors to Zermatt, we prepared for our departure; but sundry delays occurred, as I received in succession the visit of many of the village notabilities. A quite unusual degree of excitement was apparent, but it was only just before I started that I learned the real cause of the interest that had been shown in the success of my project. It was not any abstract interest in geographical science, nor a desire to enter into closer relationship with the Ger-

man population of Gressonay, nor yet the notion that tourists might be attracted to their valley by a new and interesting pass: the practical mind of Zermatt had detected in the new route a grand opportunity for carrying on free trade with Piedmont, uninterrupted by the douaniers of His Sardinian Majesty. From Cormayeur to Val Tournanche a chain of posts is maintained, whereat the *préposés* pass a miserable life in keeping watch upon every gap in the chain by which it is thought possible that untaxed tobacco, spirits, or cotton goods may be smuggled into Italy, and they don't hesitate to send a rifle-ball after any man who attempts to evade their pursuit. But the three valleys of Ayas, Lys, and Sesia, abutting against the main chain of Monte Rosa, are supposed to be sufficiently guarded by the gigantic wall of ice-bound rock which closes them in. No *préposé* has ever been set to watch these ramparts, and if by any means a passage could be found, there would be no difficulty in carrying the smuggled goods into the interior of Piedmont.

With this prospect of becoming a public benefactor, it was not surprising that, as I left Zermatt at six o'clock in the evening of the 17th August, I was followed by the cordial good wishes of the entire population, who turned out to see me off. As a message had been sent to prepare for our arrival at the châlet on the ascent to the Riffel, where I meant to pass the night, we did not hurry, and it was already dark when we reached the Augstkumme, a small group of châlets, about 7000 feet above the sea, that are now-a-days passed without notice by many a fair tourist in the ascent to the Riffel Hotel. At the highest of these, kept, contrary to the usual practice, by a *Sennerin* named Louise, here called Lovisé, we were to halt. The door was bolted, and

it seemed that Lovisé had given us up and gone to bed, but in half a minute she had struck a light, opened the door, and bid us welcome. Supper, though a superfluous luxury, was proposed, and met no opposition on my part. Hot milk, bread and butter, were soon ready, seasoned, in my case, with those tears which the wood-smoke so often draws from unpractised eyes. To close the entertainment, Lovisé set down before us a large bowl of *niedl*—rich thick cream, of which I partook sparingly; Mathias unwisely finished the remainder. While some arrangements were making for our night-quarters in an adjoining hay-shed, I went out to enjoy the night air, and to look about me, when I encountered a scene which, amidst the memories of many wanderings, still remains without a rival. The view from the western slope of the Riffel, now well known to most Swiss tourists, includes the range of peaks from the Matterhorn to the Weisshorn*, with the glaciers by which they are begirt. The moon had risen; the valley below, and all the lesser hollows, were filled with a bluish haze that stretched across to the base of the opposite peaks, not forming, as clouds do, an opaque floor on which they could seem to rest, but rather a dim mysterious depth, into which they plunged to an immeasurable distance. The great peaks and glaciers shone with a glory that seemed all their own; not sparkling in the broad moonlight, but beaming forth a calm ineffable brilliance, high aloft in the ether, far above the dwellings of mankind. Chief of them all, the astounding peak of the Matterhorn, that stupendous obelisk whose form defies the boldest speculations of the geologist—gleaming more brightly for some fresh snow that

* Plate VII. of Schlagintweit's Atlas represents a portion of the view from the Augstkumme; but it can neither be commended for accuracy nor for general effect.

rested on every furrow of its surface—towered upward into the sky. All men, even the least poetical, are variously impressed by such scenes as these, and the mind is involuntarily carried back to some scene of wonder and mystery that in early life has fixed its image on the imagination. My own fancy on that night recalled a half-remembered tale of the Scandinavian Sagas, wherein the mythical hero breaks into the assembly of the gods, where they sit in solemn conclave, fixed in deep slumber, with long white beards descending to the ground. Some such night scene, amid the wild mountains of Norway, may have suggested the picture to the old northern bard.

The deep, almost awful, silence was broken by the summons that reminded me it was time to take some sleep, and before ten o'clock I turned into the hay-shed, followed by Mathias. We were both soon asleep. At the first sound I started up, and striking a light with due care for the hay, I found that it was but half-past twelve. Mathias had gone to call Lovisé, and set her to boil the rice for our breakfast. I followed him into the open air. Strange as it might seem, the giant phantoms had not vanished, the scene was little changed; only the full moon had risen higher in the southern sky, and here and there threw a deep shadow, like a dark wrinkle, on the face of the peaks opposite, that rose in startling proximity. The cold, however, was too great to allow me to remain long. I thought it useless to start before three, and therefore turned in again to take another hour's light but refreshing sleep. At two breakfast was ready, and, thanks to the vigorous health that rewards active life in the mountains, I was able to do full justice to it. Our final arrangements were soon made, and exactly at 3 A.M. we started with cordial good wishes from Lovisé, who was at much superfluous

trouble to impress upon Mathias the necessity for caution and prudence, with both which excellent qualities Nature had largely endowed my companion.

Keeping that slow measured pace which is so advisable at the beginning of a long day's work, we mounted the slopes of the Riffel; there was not a fleck of cloud in the sky, nor a breath of air stirring below, and no sound was audible save the crunching of our feet on the turf, stiff and crisp from the sharp frost of the night. As a milky hue became perceptible in the northern sky, I thought of repeating the observations which Professor Forbes had made in the ascent of the Col du Géant, on the comparative intensity of the light of the moon and that of the morning twilight. At 3h. 55m. the writing in my note-book, that was perfectly legible in the moonlight, could scarcely be discerned when the page was turned to the north-east. Watching alternately the page in my hand and the snow on the opposite peaks, where portions that lay in the moon's shadow received the full light of the dawn, I was struck with the apparent contrast between the decidedly yellow and warm light of the moon and the cold bluish tint of twilight. As day approached, this contrast of colour was less marked, and at 4h. 6m. 30s. I could scarcely detect a difference of illumination on the snow, but on the written page the moonlight still appeared the stronger. At 4h. 9m. 30s. the intensity of the two lights appeared equal, and two minutes later there was no doubt that the dawn had triumphed. My attention was engaged elsewhere at the moment of sunrise, and I did not observe the exact time at which the sun touched the summit of Monte Rosa; but as the sun would have risen at the level of the sea in the same latitude at 5h. 3m. A.M., and the summit of

Monte Rosa is 15,223 feet higher, we may reckon that the first rays of the sun would reach it about 8m. 45s. earlier, or at 4h. 54m. 15s., omitting the correction for refraction, which in this case would be very small. Professor Forbes found on the 23rd July that the light of the dawn was equal to that of the full moon, at about the same apparent altitude, 50 minutes before the sun touched the summit of Mont Blanc. My observation, therefore, tends to show that the intensity of the diffused light of dawn is diminished as we ascend into the higher regions of the atmosphere. In my case the dawn was not equal to the moonlight until 44m. 45s. before the appearance of the sun; but my position was about 2000 feet higher than that of Professor Forbes when at 3.30 A.M. he found the lights equal in intensity.* It is desirable that the observation should be frequently repeated, as differences may be found to arise from the condition of the atmosphere, even when it appears entirely free from cloud.

Just before sunrise we had reached the Rothe Kumme, the steep slope over the Gorner Glacier, whence the range of Monte Rosa is visible in its whole extent, when a new object of interest presented itself. To the eye the air around us had appeared perfectly clear, and without the slightest tinge of vapour, when suddenly the lower zone between us and the opposite range became suffused with a

* It must, however, be remarked that at an equal interval before sunrise the sun is farther below the horizon on the 18th August than on the 23rd July. Taking this into account, the dawn did not equal the moonlight on the Riffel until the sun was nearer the horizon by 4′ than at the corresponding moment on the Mount Fréty. As the sun rises on the 23rd of July at 4h. 32m. in latitude 46°, there seems to have been some uncorrected error of the watch in Professor Forbes' observation that the sun touched the summit of Mont Blanc at 4h. 20m.; but it may be assumed that the same error affected the previous observation as to the instant of equal intensity, so the result would not be affected.

rosy flush that was accompanied by an evident diminution of transparency; this appeared to be strictly limited within a definite thickness of the atmosphere, extending to a height of about 15,000 feet. At the moment when the change took place, my eyes were turned to the south-east, over the Matterjoch, where the colour of the distant sky near the horizon was of a dark hazy blue, when suddenly it took a violet tint from the interposition of the rose colour in the air between me and the pass of the Matterjoch, as if a gauze veil had suddenly been placed between the eye and the distant sky, and clearly showing that the tint was produced in the lower and not the higher regions of the atmosphere. Most travellers in mountain countries are familiar with this phenomenon, but few have had so favourable an opportunity to observe it in the region where it is produced. It appears to me to be one amongst numerous indications that vapour contained in the atmosphere in a state of rest has a tendency to dispose itself in horizontal strata of unequal density. The exquisite tint which is seen in the Alps about ten minutes after sunset, and, less commonly, before sunrise, may probably be caused by the reflection of the sun's rays from the under surface of some one of these strata lying considerably above the level at which the rosy glow becomes visible.*

I was watching the gradual development of colour in the south-eastern sky, when I became conscious of a change. Turning to the left, I saw the Höchste Spitz and Nord End, with a rim of bright light round the highest part of the two peaks, so nearly to the same extent, that I found it hard to believe the difference between them to be as

* See note, p. 192.

great as is commonly believed. In point of fact, the height assumed for the Höchste Spitz is the mean result of a number of trigonometrical measurements; whereas, that of the Nord End is taken from the observations of Von Welden alone. Comparing together his measures of the two peaks, the difference of height is less than twenty-three mètres, or just seventy-five English feet; and this is probably not far from the truth. The Lys Kamm, Zwillinge, Breithorn, and Mount Cervin, were touched so nearly at the same moment, as to make me suspect that the heights of the second and third have been under-estimated. Trigonometrical measures of round-topped snow peaks, where no fixed mark indicates the actual summit, are necessarily exposed to serious error. The Dent Blanche and the Gabelhorn did not catch the sun for nearly half a minute after the last-mentioned peaks.

Now was the time to take a last careful survey of the course by which I hoped to ascend, a precaution that should never be omitted before starting on an unknown glacier. Mathias, who till now had probably never looked with any attention at this part of the snowy range, declared loudly that we never should succeed in mounting the broken part of the glacier. I thought it rather soon to give in, and merely said that I meant to try, and, if we could not pass, it would always be easy to return. We were not long in scrambling down to the glacier at a point directly opposite to the Schwärzeberg. I had consumed, not lost, a little time in observations that could not often be repeated on so glorious a morning at so great a height, and it was twenty minutes past five when we touched the ice, still dry and crisp from the sharp frost of the night.

What enjoyment is to be compared to an early walk

over one of these great glaciers of the Alps, amid the deep silence of Nature, surrounded by some of her sublimest objects, the morning air infusing vigour and elasticity into every nerve and muscle, the eye unwearied, the skin cool, and the whole frame tingling with joyous anticipation of the adventures that the day may bring forth? In this mood I advanced over the glacier somewhat ahead of Mathias, rejoicing in the friendly shadow that the Nord End flung for miles along the great ice stream, when a new incident occurred, of which I fear that I can give to the reader no lively impression, although the recollection of it after so many years is still delightful. We were approaching the moraine from the Nord End; the air was perfectly still, as the glacier was; the thousand trickling runlets that furrowed the ice yesterday were now at rest, and there remained fantastic structures on the surface of the glacier, some of them like children's houses of cards, with walls and successive floors one above the other, the results of alternate melting and freezing, and draining away of enclosed water, on the porous surface of the ice. On a sudden, as if from some prodigious distance, there fell upon my ear the sound of musical instruments, pure and clear, but barely distinguishable. I halted and listened: there could be no doubt, there was the beating of a drum, and from time to time the sound of brass instruments. I asked Mathias, who now came up, what he thought of it, but he had no idea of the cause. Then remembering that persons passing the night at the Grands Mulets have declared that they heard the church bell, and even the barking of dogs, at Entrêves or Cormayeur, I straight imagined that they were celebrating a festa in some of the valleys on the Piedmontese side of Monte Rosa, from which direction the sound seemed to come.

We moved on, and the sounds continued, becoming rapidly more intense, and soon, as we approached a deep, narrow crevasse, the mystery was explained.

At a considerable depth below us, a trickling streamlet in the interior of the glacier fell from one ledge of ice to another; the crevasse under our feet played the part of an organ pipe, and the elastic mass of ice struck by the descending rill produced sonorous vibrations. Two interesting conclusions followed from this charming experiment in the laboratory of the glacier. First, that the movement of water in the interior of a glacier is not stopped at night, and hence that a sharp frost probably does not penetrate very far below the surface; second, that the formation of fissures transversely to the direction of the veined structure, and parallel to the surface of the glacier, is not confined to the lower extremity of a glacier, where such fissures are constantly seen in and above the roof of the cavern whence the glacier torrent flows, but may probably extend in many directions throughout the glacier. I had often suspected that the water which percolates the ice in warm weather finds here and there a channel along nearly horizontal surfaces in the interior of the glacier *, but during the daytime the sound of running water is heard in so many directions that it is impossible for the ear to follow any single streamlet; now, however, in the silence of the surface I could distinctly assure myself that the streamlet below ran along a slightly inclined bed until it reached the crevasse, from whence it fell to a lower level in the interior of the glacier.

We advanced rapidly, and soon crossed the great glacier, keeping a little to the right of the Schwärzeberg. The

* See *antè*, p. 43.

lower part of the Schwärze Glacier was easily traversed, but we soon reached the fresh snow, of which a good deal had fallen a few days before; I therefore arranged the rope for immediate service, passing it round the body of each of us under the arms, and keeping it in its place with a bit of twine.

At the point where our difficulties began, at the intersection of the two systems of great crevasses, I made a rough sketch, from which the annexed plate has been taken. At the very first bridge the snow yielded under both my feet, and I fell through as far as the waist, but with the help of the alpenstock, laid flat upon the surface, I had no difficulty in scrambling back again. It was the first time that such an accident had occurred to me, but, as I wished to keep Mathias in good spirits, I treated it as a mere matter of course; that worthy was, however, grievously perturbed, and commenced an urgent request, which was destined to be repeated very often during the day, that I should abandon an attempt which he declared to be full of mortal danger. I briefly explained to him the security which the rope afforded to us both, and soon found a solid bridge, over which, with some persuasion, he was induced to follow me.

We now had before us, and to the left, the great mass of ice cliffs that I had been watching from afar, and through which I had failed to trace any probable issue; to the right was a labyrinth of wide crevasses, among which I determined to seek a passage along the base of the cliffs; but these, rising steeply to the southward, had sheltered from the sun the thick coating of snow that covered the ice ridges between the crevasses, and made it neither easy nor safe to attempt to spring from one ridge to another. Though it must cost some time, I resolved to try them systematically one after the other, so as to lose

no chance of success. Some snow bridges supported us, others failed as the first had done; at length I thought that I had found a passage; but a few blows with the alpenstock on a snow bridge that spanned a wide crevasse, sent it crumbling down into the blue depths of the yawning chasm below, and I was forced to return. When each ridge had in turn been tried and found impracticable, Mathias said, with a provoking tone of triumph — "I told you we should have to return;" but he was grievously disconcerted when he found that, as a last resource, I was about to attempt to scale the ice cliffs. Most of them presented towards us nearly vertical faces of blue ice, but others, as if through some subsidence or internal dislocation, seemed to have heeled over to the southward, leaving on the opposite side steep slopes at an angle approaching to 60°. Here the snow, which had been so inconvenient a short time before, was of essential service. Covering the hard ice, which otherwise I should have scarcely dared to climb, it gave us a firm footing. I, of course, went first, and cautiously made the track. The scene was an extraordinary one, for I have never before or since seen ice broken into such vast and imposing forms as those that now surrounded us. Sometimes, after laboriously crawling to the summit of a pinnacle more than a hundred feet in height, it was necessary to creep down again into a hollow from which no object was visible, save the sky and the threatening towers and spires of ice that rose on every side. Several times I found it necessary to pass just under the projecting cornice of snow, fringed with long icicles, that capped the top of each pinnacle. Silently and stealthily we crept by, between the ice wall and the pendent icicles, and I warned my companion carefully to avoid touching these, as the slightest disturbance might bring the frail

roof down upon our heads. The rough illustrations here given, done while the scene was fresh in my memory, give a better notion than any description can do of some of the positions in which we found ourselves.

ICE PINNACLES OF THE SCHWÄRZE GLACIER.

The latter of them represents the most serious difficulty which we encountered. We had surmounted the greater

part of the ascent that was to conduct us to the comparatively level fields of névé above the ice cliffs, and were upon the outer slope of a lofty pinnacle that at a great height overhung the glacier. I had climbed to the top, expecting to descend on the other side, but I there encountered an ice wall descending nearly vertically for sixty or

ICE PINNACLES OF THE SCHWARZE GLACIER.

eighty feet. It was clearly necessary to return, but I saw that if we could pass at a level along the face of the cliff we should be able to continue our route. The slope was formidably steep, certainly not less than 60°; and when Mathias perceived that I was preparing to attempt it, he began to remonstrate more loudly than ever, with the air

of a man who was going to certain death. I was obliged to assume a tone of command, telling him that while he strictly obeyed me he was safe, but the slightest disobedience would be certainly fatal. As in truth I had no intention of doing anything foolhardy, I adopted unusual precautions. Desiring him to plant himself as firmly as possible in the steep snow slope, I advanced, cautiously making good tracks for each foot as far as the rope would allow, and then made myself firm with my heavy alpenstock. I then gradually drew in the rope as Mathias approached me, prepared to give him some help if he were unfortunately to slip. I was most afraid of his being unnerved, if his eye were to wander down the dizzy slope into the yawning crevasses of the glacier that lay far beneath us, and I ordered him to keep his eyes constantly fixed upon the spot where he was to place his foot. Three or four times the same process was repeated, and we had surmounted our most serious difficulty. We soon arrived near to the summit of the ice cliffs, and there remained at last but a moderately steep slope of twenty or thirty feet to attain the long-desired upper plateau of the glacier.

The sun was now beginning to tell with effect upon the snow. The slope consisted of ice, with a coating of six or eight inches of snow. As I attempted to advance, the softened crust yielded, and slid down with me on the surface of the smooth hard ice. Over and over again the same thing was repeated, and it seemed as if, after overcoming so many serious obstacles, we were to be stopped by this petty barrier. With some difficulty, and a good deal of labour, I was able to clear away the snow from one step after another, so as to cut into the ice with my geological hammer, and when I reached the top I easily drew up Mathias with the help of the rope.

Now, for the first time, there was a pause in the struggle which had been maintained for many hours, and it was possible to look backwards at the view which had opened out to the northward as we had risen far above the minor intervening ranges. The most prominent distant object, between the beautiful pyramids of the Weisshorn and the Mischabel*, was the range extending from the Aletschhorn to the Nesthorn, and separating the valley of the Rhone from the Lötsch Thal. Time pressed, as it was yet uncertain what new difficulties we should encounter in the descent; and, as the view from above would be still more extensive, I resolved to continue without delay the ascent of the snowy slopes that still separated us from the pass. The glare of full sunshine reflected from the myriad crystalline facets of the snow had become intolerable, but, up to this point, while everything depended on my close attention to the most minute details, I had not ventured to use the veil. I now put it on, and thought I was entitled to ask Mathias to take a turn of the fatiguing, but no longer dangerous, work of going first to make the track in the snow, in which we sank at every step nearly to the knees, and here and there even above them. He accordingly went to the front, but, after ten minutes, stopped short at a narrow crevasse well bridged over, and, turning round, said he did not like to be the first to cross so dangerous a place. I resumed my old position without saying a word, but resolved that, come what might, I would not again ask any assistance from so spiritless a creature, and refused him the post of honour when he afterwards asked for it.

The distance up these snow slopes had appeared from

* Seen from the southward, it is scarcely possible to separate the twin peaks of the Dom and the Täschhorn: they show as a single pyramid of ice resting on steep rocks.

below to be but trifling, yet an hour passed and we were still plunging on through the soft caky mass that formed thick balls round our ankles that had from time to time to be knocked off with the alpenstock. The heat of the noon-day sun on the head was almost insupportable, but I found some relief from hoisting an umbrella, the advantage of which in similar situations I have proved in subsequent expeditions. Twice we halted for two or three minutes, and I looked back with great interest on the same range which had been from below less fully visible. I believe that the three principal peaks were all visible. To the right is the Aletschhorn, not then known to be higher than the Jungfrau; the latter being 13,671 feet, the former 13,803 feet in height. Next come two peaks that may be counted as a single one, being nearly of equal height, and seen in the same line—the Schienhorn, 12,638, and the Gross Nesthorn of Dufour's map, 12,533 feet in height. Farther to the left is a beautiful 12,969 feet high pyramid, whose various names have caused some confusion among Swiss writers. On the north side it towers over the Lötsch Thal; and on the south it divides the parallel valleys of Bietsch and Baltschieder, and in each valley it has a different name, being known alternately as the Nesthorn, the Bietsch-horn and the Baltschiederhorn.

For a fuller enjoyment of the view, I waited till we should reach the highest point of the ridge, and pushed slowly onward. Whether from mere fatigue or from the diminished density of the air, the last part of the ascent was rather distressing, and at every twenty or thirty steps I paused for a few seconds to calm the circulation which was somewhat, though not greatly, accelerated. At length, at a quarter-past one, we attained the long-desired summit of the ridge.

Until that moment we had not seen a single cloud in the sky; great, therefore, was my disappointment to find stretched out on the side of Italy, about three or four thousand feet below us, a vast boundless sea of fleecy clouds, through which arose here and there, like islands, the summits of some of the higher peaks in the ranges that diverge to the southwards from the great mass of Monte Rosa or lie to the south-west of the Val d'Aosta. It was of great importance to us to determine our position with reference to some known point on the southern side. An occasional break in the clouds immediately under us disclosed a deep valley, and it was, probably, rather the desire that it might be so, than any particular resemblance, that made me identify a high rocky peak, to the right or western side of that valley, as the Grauenhaupt. I had expected to find myself opposite to the ridge dividing the Val de Lys from the Val d'Ayas, and to descend by the eastern side of that ridge into the former valley somewhere above Gressonay la Trinité. It would, however, be all the better if the glacier below us were to conduct us directly into the head of the Val de Lys, as would be the case if my too hasty supposition were correct. Turning round to view the panorama to the northwards, I was surprised to find that it was no longer visible. During the ascent we had gradually approached the long wall of rocks form ing part of the Breithorn, and a portion of which is represented in the plate. During the last quarter of an hour of the ascent we passed, without my remarking the fact, round the upper projecting corner of these rocks, which were scarcely 100 feet higher than where we stood, but completely shut out the view. By going a short distance to the east, I opened the view of the Dom, which bore 38° mag-

netic east. Had time allowed it, there would have been no difficulty in ascending the western peak of the Zwillinge, which rises immediately above the pass some 600 or 700 feet; but, having to descend over nearly ten times that vertical height of utterly unknown glacier, such an excursion was not to be thought of.

The south wind on the crest of the ridge, though not violent, was unpleasantly cold; and I accordingly advanced a short distance down the gentle snow slope, on the southern side, before halting for luncheon. Nearly twelve hours had passed since breakfast, and I had taken nothing but three or four chocolate lozenges; the small pebble of quartz, which I always carry in my mouth, had prevented any unpleasant feeling of thirst. Mathias, who complained much on this score, had had recourse to the wine, and seemed to be rather the worse for it, as he had no appetite, and I had some trouble to induce him to eat his share of our small stock of bread and cold meat. I set fire to my boiling-water apparatus, which was to supply a warm drink, and to measure the height of the pass; but, for the first time after a month's continual use, it was out of order, owing to a leak in the spirit lamp. Cold tea, mixed with a little wine and snow, formed a not unpalatable drink. The height of the pass I estimated at the time to be about 12,700 English feet; subsequent comparison with the adjoining peak of the Zwillinge, whose height is 13,475 feet*, would lead me to

* As before mentioned, the appearances at sunrise made me doubt the existence of any considerable difference between the heights of the Lyskamm, the Zwillinge, and the Breithorn. All the admitted measurements, as I believe, rest on the authority of M. Berchtold. The Lyskamm is said to be 4247 metres; Pollux, or the eastern peak of the Zwillinge, 4107; and the Breithorn, 4148 metres. But in Ziegler's Catalogue, among the peaks of the Rosa group is enumerated the "Weissbrüder"—height, 4245 metres, —authority, "Bund Müller." I do not know to what peaks the name and the height given can apply if not to the Zwillinge. If the height of the Western

add 50 or 100 feet to my first estimate: it is certainly by far the highest pass which has yet been effected in the chain of the Alps. By analogy with the name of the nearest pass on the eastern side, and to commemorate the long range of dark rocks that leads towards it from the Breithorn, I proposed at the time that it should be called the Schwarz Thor, and have taken the liberty of preserving that designation in the title to this paper. Owing to the irregular force of the wind, and the difficulty of shading them efficiently from the sun, the themometers oscillated much; the temperature of the air was about 47° Fahr., and in the sun it varied from 49° to 53°.

It was now two o'clock, and high time to resume work: we shouldered our knapsacks, Mathias being now relieved of the greater part of his load, and got again into harness. My desire was, to effect the descent on the eastern side, so as to reserve to myself the power of bearing still further in that direction, across the ridge into the Val de Lys, in case it should turn out that the valley below us was, contrary to my present belief, the Val d'Ayas. A sudden opening in the clouds below, showing for a moment in the distance a village with its church, and an adjoining green expanse of level meadows, which was at once identified as St. Jean de Gressonay, helped to confirm my mistake. We now started, keeping, at first, as far as possible to the left. I soon came to the brink of an enormous *bergschrund*, which I followed for a short distance, till I was able to assure myself that on that side the descent is utterly impracticable. I afterwards saw from below that it presents a succession of precipitous faces of rock and ice, by which

Zwilling be 13,928 feet, as this would seem to show, that of the Schwarz Thor cannot be much less than 13,200 feet. But the form of the summits in this part of the range is unfavorable to accurate trigonometrical measurements.

it could never have been possible to effect a passage. My next thought was to attempt the descent by the middle of the glacier: three times I went forward, and each time was obliged to return, by the breaking of the snow bridges over which I attempted to pass. The last of these presented the most striking scene of the kind that I have ever witnessed. I was over a great *bergschrund* completely roofed in with a thick coating of snow; towards the crown of the arch the roof gave way with me, and though the position is not quite a comfortable one, I had become so far used to it in the course of that day, that I paused for a second to glance down into the vault, over which I hung suspended. The chasm appeared to be about 30 feet wide, and went down to a depth that was veiled in blue darkness; on either side was a fringe of enormous icicles, forty or fifty feet long, suspended from the cornice of the roof; most striking of all was the exquisite pale blue light, that alone penetrated the snowy roof, and increased the mysterious character of the unearthly scene. The glance was but a momentary one, for there was no time to be lost in withdrawing from so unusual a position; my arms remained above the snow, and with a little help from the rope, I had no difficulty in regaining the solid bank. I may say, once for all, that where two men are united by a strong rope, there is no danger from the falling in of snow bridges, provided the man who remains behind keeps the rope stretched, and is attentive to give a moderate degree of assistance at the moment when it is wanted. On this score I had to give frequent warnings to Mathias.

Nothing now remained but to attempt the descent on the right hand by a steep *couloir* close under the Breithorn rocks, a course which my companion had already urged, and I had resisted, partly because it was the opposite direction to that which I wished to take, and partly

because I knew that ice detached from the edge of the plateau above the rocks fell into this *couloir*. I found the descent easier than I expected, the only inconvenience being that the foot sometimes rested on a block of hard ice fallen from the rocks above, and at perhaps the next step would sink above the knee into soft snow. We advanced rapidly, and were before long out of the reach of falling ice.

We had gained a point commanding a view of the lower part of the glacier when, fortunately, the clouds broke away, and for the first time I was able to see part of the route that we still had to traverse. For a considerable distance the névé on this side of the glacier stretched downward in rather steep slopes almost free from crevasses, but in front the progress of the glacier was arrested by a precipitous buttress of dark rock, thrust out nearly at right angles to its course. Encountering this immovable obstacle, and forced abruptly to change its direction, the glacier is rent on all sides by wide crevasses. I devoted some minutes to a careful examination of the surface with an opera-glass, making mental memoranda of the arrangement of the crevasses, and the position of the snow bridges, which were all laid out before me, like the pieces on a chess-board. We pushed on again, and before long found ourselves in the broken part of the glacier, the crevasses every moment becoming wider and more numerous. Mathias, who had not seen the coming difficulties, was now fairly overwhelmed with consternation. He had flattered himself that our troubles were at an end, and he now found himself, with evening fast advancing, in one of the most awkward positions that we had yet encountered. I soon saw that it was impossible to advance along the middle of the glacier. He urged me to keep to the right, towards the rocks. As these were quite inaccessible, and the

glacier adjoining them was sure to be more crevassed than elsewhere, this plan was out of the question, and I told him he had nothing to do but to follow me. His astonishment and anxiety were great when he saw me face round and begin to reascend the glacier, but bearing to the east. I had no difficulty in finding a somewhat circuitous way that I had traced out from above, and in a short time we were safely landed on a rocky mound, that rises in the middle of the Glacier of Ayas, and divides the lower part of it into two separate ice-streams.

I felt some satisfaction at again touching *terra firma*, after more than thirteen hours of snow and ice, and at having got through our difficulties before dark. As for poor Mathias, there were no bounds to his joy and his gratitude to me for, as he said, having delivered him from death! He thanked me again and again, as if I had exerted myself to find the way exclusively on his account. I was glad to meet on these rocks, perhaps never before visited by traveller or botanist, a few rare plants, one of which—*Senecio uniflorus*—served to fix our geographical position, as it is peculiar to the southern valleys of Monte Rosa. The clouds now closed around us, but our difficulties were at an end. After a few minutes' halt we quitted the rocks, where I left the opera-glass that had just proved itself so useful; a short scramble took us down to the eastern branch of the lower glacier, which was soon crossed, and before long we struck upon a cattle track, that led us to a pasture close to the foot of the glacier. A lift in the clouds showed that we were near to a small châlet, with the herdsman standing by the door. Still believing that we were in the Val de Lys, I went up to him and asked him in German how far we were from La Trinité. He was seemingly bewildered with surprise, and for some time we

could extract no intelligible reply to my questions. Failing German, I tried my best Piedmontese, with little better success; it turned out afterwards that French would in all probability have been more serviceable. Not being able to find out where we were, or how far we should have to go before finding shelter, we pushed on down the valley, declaring our new acquaintance to be incurably stupid. It was not surprising that this poor man, who probably passed his life at the foot of these glaciers, and looked upon them as the end of the world, should have been somewhat astonished at the first apparition of strangers, oddly attired, and armed with long spiked poles, suddenly presenting themselves at night-fall in a spot so remote and utterly unfrequented. It was past seven when we left the châlet, and in about an hour's walk over a rough track we arrived, as it became quite dark, at a small village. Shelter and rest were welcome wherever we might be, but it was with a little disappointment that I found we were not in the Val de Lys, but at San Giacomo d'Ayas, the highest village in the valley of that name.

Without much trouble we found lodging in a house tenanted by a solitary old woman, whose husband, I think, was absent. The larder contained bread, butter, and eggs, with which, though tired after the day's hard work, I proceeded to make a good-sized omelette. Mathias, however, was regularly knocked up. It was not, as he declared, from fatigue, but from mortal anxiety, "grossen angst," that he was now in a sort of collapse, unable to eat or to exert himself in any way. It seemed that for that day I was to do everything myself, so I not only cooked the omelette, but ate it. A hay-shed adjoining the house was our dormitory, and we should probably have slept well, but for the painful state of our faces and eyes. When we

rose at six o'clock, poor Mathias, who in other respects was better, suffered grievously from inflamed eyes; and, partly owing to the cooking operations of the previous night, I was in not much better plight. We parted after breakfast, he to return towards Zermatt, I to cross the Betta Furke to the Val de Lys.

Mathias afterwards told me of an affair in which he played a part, while on his way back to Zermatt. On the day we parted he slept at the châlets of Aventina, and on the following morning, the 20th of August, resumed his journey by the Cimes Blanches, and the Col de St. Théodule. The weather was heavy, and the clouds lay on the snow. When near the summit of the col he came upon a stranger, alone, and in a state of extreme excitement from anxiety and terror. He explained to Mathias that, a short time before, his guide, who was a few paces in advance, had suddenly disappeared down a chasm in the snow, which had given way under his feet. The stranger, who was an Englishman, and probably unused to glacier travelling, was utterly at a loss how to proceed, without the means of attempting to succour his unfortunate companion, and not daring to continue his journey in the midst of such unseen dangers. The appearance of my not very heroic companion was naturally regarded by the alarmed traveller as a providential deliverance. Nothing could be done to extricate the body of the guide, and Mathias had no difficulty in conducting the traveller safely to Zermatt. It turned out that the guide was a man from the lower part of Val Tournanche, not well acquainted with the pass, and that, wandering a little from the true course, he had got upon a part of the glacier where concealed crevasses are numerous. A rope would, of course, have saved this man's life, as it would most of those that

are lost upon the glaciers. When it became known at Zermatt that the would-be guide was an interloper, and not one of the three or four men who at that time professed to show the way from Val Tournanche to Zermatt, complete indifference, or perhaps a little secret satisfaction, was felt as to his fate; and it was only when it became known that the traveller's money was contained in the knapsack which the deceased man had carried, that active steps were taken for the recovery of his body. A coroner's jury of the natives would certainly have returned a verdict of "Served him right;" and, if I had been one of the panel, I should have been tempted to agree in the finding, on account of his neglect of the rope.

On the day following the passage of the Schwarz Thor, the clouds lay low, and I had much trouble in finding my way over the Betta Furke. Local attraction interfered with the compass, which therefore misled me, and I had to redescend twice from unsuccessful attempts to force a passage where there was none. The skin completely peeled off from my face and neck, which felt uncomfortable for several days, and during the same time my right arm was partly useless from the extreme exertion of sounding with a heavy alpenstock without intermission for so many hours. The effects of the severe day's work, doubtless increased by having carried my knapsack, were perceptible for some time. These drawbacks, however, were far from counterbalancing the great enjoyment of the expedition. With a companion, whether a professed guide or amateur, who could have taken an equal share of the day's work, there would have been no reason to complain of fatigue.

The account given by Mathias of the difficulties of this pass seems to have put an end to the hopes felt at Zermatt of using it for smuggling purposes. I have heard of but

two attempts to cross it since 1845, the first of which failed, and the second, made by my friend the Rev. Mr. Davies and a party of companions, was successful. I am not aware whether they took the same route that I did, but I have since thought that by mounting along the rocks of the Schwärzeberg, and continuing in the same direction to the east of my track, the ice cliffs could be attacked at a higher point, and most of the difficulties of the ascent be thus avoided.

The foregoing narrative is nearly a translation of one written by me in 1846, at the request of a Swiss friend, for the *Bibliothèque Universelle* of Geneva, but which, owing to accidental circumstances, was not communicated to that journal. I fear that having been written at a time when the upper regions of the Alps were less familiar than they now are to many travellers, this account may seem to dwell more than is necessary on some of the not unusual incidents of high glacier expeditions. Most of the writers in this volume, and many other English travellers, have of late years accomplished feats much more remarkable than any of which I can boast; but this expedition having been made at a time when there were no guides at Zermatt at all familiar with the higher glaciers, and when their risks and difficulties were ill-understood and therefore overrated, it is probable that I myself, as well as some Swiss friends, may at the time have thought more of the expedition than it deserved. I have not, however, been able to detect any statement that seems to me exaggerated, nor have I found it possible materially to alter the form in which the account was originally entered in my journal. With this explanation, therefore, I submit it to the indulgence of the reader.

J. BALL.

NOTE.

The annexed rough diagram may make more clear the suggested explanation of the cause of the rosy glow seen in the higher Alps while the sun is below the horizon:—Let A B be a section of the earth's surface, C and D mountains with a valley between them, and O P a stratum in the higher regions of the atmosphere, wherein the aqueous vapour is in such a condition that the sun's rays are partially reflected from its under surface.

If we suppose the stratum of air between the mountains C and D, and bounded by the dotted lines *e f* and *g h*, to be charged with vesicular vapour of the precise degree of tenuity that gives the rose tint, it is clear that the rays reflected from the surface O P will reach it when the sun is a short distance below the horizon, and the ray S R T is reflected from R on the sunward side of the mountain C. But when the sun is on the verge of the horizon, the ray will impinge on the surface O P at a point R′ over the mountain C, and the reflected ray R′ T′ will no longer reach the valley between C and D. Some such explanation I presume to be necessary to account for the interval that is always observed between the full glow of rose colour and the moment of sunrise or sunset. The reason why it is never seen in perfect purity and steadiness when the sun is above the horizon is, probably, that the heating power of the sun's rays disturbs the uniform condition of the vapour suspended in the stratum of air through which they pass.

CHAP. VII.

AN ASCENT OF ONE OF THE MISCHABEL-HÖRNER, CALLED THE DOM.

Till lately, the name and the situation of the highest mountains which Switzerland could call exclusively her own,—Mont Blanc being claimed by Savoy, and Monte Rosa, in part at least, by Piedmont,—were unknown to ordinary Swiss travellers; and at this moment there are but few who are aware of the pretensions of the Peak which forms the subject of this narrative. This obscurity of so high a mountain is partly due to the uncertainty which prevailed till the date of the latest survey, as to which, amongst several summits of nearly equal height, was actually the highest; but still more to the modest and retiring character of the mountain itself, which is almost entirely hidden from the lower valleys by intervening masses, and is scarcely seen from more than one point of view as a distinct and imposing object amongst its magnificent companions.

Those, however, who have had the delight of studying the panorama of mountains from the Gorner-grat, will remember that in telling off the peaks from the east northwards, after the Strahlhorn, the Rympfischhorn, the Alleleihorn, and the Alphubel, they come to two fine sharp summits called the Mischabel horns. These are of very nearly equal height, and both higher than any mountain, except Monte Rosa, which can be seen within the horizon.

The nearer is called the Täschhorn, from the village which lies at its foot, in the St. Nicholas valley; the farther is called the Grabenhorn, or, by a pleasanter as well as shorter name, the Dom.*

On the opposite side the Dom appears to much greater advantage. It is the highest mountain to be seen from the Great Aletsch glacier, or from the Æggischhorn; and one who has been fortunate enough to be on that glacier before sunrise, and to see the fine snowy mass crowned by the peak of the Dom, side by side with the beautiful Weisshorn, receiving the first rays of the morning sun, will remember the sight as one scarcely surpassed amongst the Alps.

The Mischabel horns rise with remarkable steepness between the valleys of St. Nicholas and Saas, the distance from valley to valley at that point, as the crow flies, being only some six or seven miles. The village of Zermatt, which heads the former valley, being provided with so many more prominent and attractive neighbours, the Mischabel horns have hitherto received most attention at Saas. The curé of that village, the hardy and intelligent M. Imseng, has made several attempts to ascend the Dom from that side; and in 1856, Mr. Chapman also ascended to a considerable height from Saas. I do not know the particulars of these attempts, which may have failed through want of time or unfavourable weather; but probably, even under propitious circumstances, the ascent would be more difficult on that side than it has been found to be on the western side facing Randa. In the summer of 1858, Mr. Cayley attempted the ascent from the latter

* See map facing page 206.

village, and would, no doubt, have succeeded, had not a mist come on, which stopped him not far from the summit.

Later in the same summer, while spending a few days at Zermatt, I felt the desire to wind up a happy Swiss holiday with some excursion over untrodden ground. Of all mountains not yet climbed the Weisshorn is perhaps the most fascinating, especially to those who have looked at it day after day from the Upper Rhone valley. I proposed, therefore, to Johann zum Taugwald, with whose experience and resources as a guide I was familiar, and whose honest simplicity and quiet good humour make him a very pleasant companion, that we should try to get to the top of the Weisshorn. He thought we might manage it, and we began to speculate on the route to be taken; but, happening ro talk about it to Mr. Clemenz, the landlord of the Mont Cervin hotel, I found that he strongly re commended us to substitute the Dom for the Weisshorn. The worthy landlord was also President of the Council of his canton, and took a zealously patriotic view of an ascent of the highest Swiss mountain, assuring me that such an achievement would have "a quite other significance" for the traveller himself, and for the village of Zermatt, than would belong to the ascent of any other mountain. I yielded to his representations, especially as he added that we should be almost certain to reach the top of the Dom, whereas the Weisshorn was thought by many to be inaccessible from the valley of St. Nicholas. My guide was equally ready for the Dom, of which he knew more than any one else, having been with Mr. Chapman on one side of the mountain, and with Mr. Cayley on the other. So we fixed a day; Taugwald engaged a younger Zermatt guide, named Kronig, to act as porter, and on Friday after-

noon, September 10th, we walked from Zermatt to Randa, where we were to spend the night.

There is no inn at Randa, but the curé is able and willing to receive travellers into his house, and to give them a bed and village fare. I sat out in the village talking with him, enjoying a delicious evening, and learning something about the educational condition of the country. He had been a teacher for some time at the college at Brieg, a purely ecclesiastical institution, but which imparts a certain kind of knowledge and culture to a good many of the peasants of the valleys. I had been surprised, on an excursion of the previous summer, to hear Johann's brother, Stephan zum Taugwald, say with a smile, as he presented a draught of wine, "Vīsne bibere, Domine?" and to learn that he spent the greater part of the year at Brieg, preparing to be a priest, and regularly returned to Zermatt for the summer months, to make hay whilst the touristical sun was shining. Many of the priests must be drawn in this way from the peasantry of the country; and there may be some who carry on their studies at the college for a time (the full period being seven years), and then withdraw to take to other callings. I made the acquaintance the next morning of a student of this class, belonging to the village of Randa; and as we sat talking that evening the priest exchanged some short remarks in Latin with a neighbour who seemed to be one of the residents of the place. The education of the young in each parish, at least in the remoter and less populous districts, is carried on by the curé, who acts as schoolmaster, and keeps school regularly during the winter season.

I had every inducement to retire early, as there was nothing to do in-doors when it had become too chilly to stay

out any longer, and I had the prospect of an early call in the morning. There was a great height to climb, apart from any difficulties we might encounter, and I had expected to spend the night somewhere amongst the rocks on the mountain side. But this was voted unnecessary, and we lay down for some broken slumber under the curé's roof. Soon after one o'clock the friendly face of Johann showed itself in my room, and brought a good account of the weather—that anxious subject for all Alpine travellers. We drank our coffee; packed up the day's provisions; looked to the rope and the hatchet; marked the time, ten minutes past two by the curé's clock; and sallied forth by the light of a lantern.

We were soon joined by a volunteer comrade—the student whom I just mentioned—who made up our party to four. It was very dark, and I could see little except the lantern in front of me. But our course from the beginning was a very direct one, varied, that is, chiefly by zigzags—a style of route by which those who climb steep mountains must be content to have their patience exercised. We passed the first meadows, and took to a path which led through scanty woods to the higher slopes on which cattle grazed, till it grew light enough to leave the lantern behind. Before we left the last trees, the hatchet was put in requisition to procure a small pole to erect as our trophy on the summit, but we were lucky enough to find a substantial branch already cut, which was slung to the back of our Randa volunteer. Then followed a long climbing of rocks, with sometimes a difficult bit giving work to hands and knees, but cheered by the increasing daylight. About the time that we welcomed the first direct rays of the sun, we exchanged our rocks for the

short glacier which came down on our right, and then we had a splendid view of the Weisshorn opposite. It was a part of our enjoyment to watch this glorious mass as we rose higher and higher, and its white bosom of snow took so exquisite a tint of soft aërial pink just before the sun shone right upon it, that my taciturn guide Johann was himself moved to unwonted enthusiasm. We had everything to put us in good spirits, for the weather was magnificent, the air fresh and serene, the sky without a cloud.

The glacier presented none but ordinary features. We met with something of a wall, which required care and pains to mount; but we were not much troubled with crevasses, and the snow was crisp and not very deep. We made our way towards a rocky ridge which cut into the glacier, where we determined to breakfast.

We stopped here about eight o'clock, to rest and refresh ourselves, and prepare for the stiff part of our day's work. It was already colder than was pleasant, and before we started we buttoned up close, put on gloves, and tied down our wideawakes over our ears. We had not been able to see far above us, and at our breakfasting place, tthogh it commanded a good view, we were not within sight of the actual summit of the mountain. But we knew we had to climb a steep and narrow *arête*, which stretched upwards on our right in the direction of the peak. The cold wind caught us sharply as we tackled these rocks with feet and hands, and as we stopped now and then to cut steps across a hard slope of snow. But we were soon rewarded by the sight of the Dom, carrying a streamer of powdery snow blowing from its crest.

We had a rather fatiguing pull through deeper snow before we could get to the top. On the side facing Zermatt

and Monte Rosa the summit is cut sharply down, and the side at right angles to this, facing Saas, is also precipitous; but in the angle between, facing north-west, the snow lies, though the surface is irregular, and there is considerable choice of precise routes. When you get near the very top, you are obliged to keep close to the Zermatt edge, which resembles the sheer descent from the Finsteraarhorn to the Aar glacier. Such a situation is one of the most impressive to the imagination and to the nerves, but the rope precludes all real danger. So we found ourselves, about eleven o'clock, assembled without any mishap on the actual summit of the Dom.

Unfortunately there is no comfortable seat there. There are no rocks, and though there is plenty of room the wind blows freely over the snowy platform; so we had to stand in the snow, shivering with the cold, which was sufficiently intense. But what a point for a view we had gained! It seemed ungrateful to think of any drawback to our enjoyment. I had never been at such an elevation before, so it was no wonder that the scene appeared to me grander than anything I had yet looked upon; but Taugwald, who had been very often on the top of Monte Rosa, insisted, with chattering teeth, that our view was greatly superior to that from the higher peak. Certainly it was a point in our favour that we had that beautiful range itself before us.

Perhaps, at such a height, the first curiosity is to see how far you can look *down*. From the edge of our peak, taking care not to trust rashly to the treacherous snow, we could see Zermatt, only a few miles distant, but nearly 10,000 feet below us. It looked very distinct, though minute, and we indulged a hope that some one there

might be looking at the Dom, and by the help of a telescope might discern us clustering on the extreme point. We looked down also to the left, upon the broad mass of the Fée glacier, and could easily see the Fée châlets, but Saas and the valley above it for some distance were shut out by some lower range from our view.

But the really interesting characteristic of such a scene as that we had surrounding us, is the host of mountain peaks set in array before you. Those who speak slightingly of the advantages to be gained by ascending to the highest points do not know what it is to see mountain tops spread out beneath you, almost like the stars of heaven for multitude. The greater ranges rise in mighty curves and backbones, ridged with shining points, and give distinction to the scene; but in that country of Alps, wherever you look there is a field of mountains. The higher you rise, the more magnificent is the panorama you command. And there is no straining of the eyesight here, to pick out some town or natural object which you ought to see but cannot. You give up the plains at once, and the mountains are visible enough. Northwards, we had the Bernese Oberland in full view. The second mountain of that group, the Aletschhorn, which deserves to be climbed for the view it must command, looks well from the south; and is backed by the Jungfrau and its neighbours, with the Finsteraarhorn a little way on the right. Westwards, we have our friend the Weisshorn separated from us by the narrow valley of St. Nicholas. We cannot see Randa, but we scan the whole side of the opposite mountain, and we determine what would be the best route for an ascent. There are fine mountains south of the Weisshorn, but we look over them, and see the Combin standing out boldly, and beyond

that the Mont Blanc range, very compact and distinct. Then we come round to the Matterhorn and Monte Rosa, and look over into Italy, where ranges of Apennines bound our view. Eastwards, we have a broad scene of less distinguishable mountains.

If I were to fill in the catalogue, however, of which I have given the most important names, I could not impress the scene on the reader's mind. I must be content with protesting that there is a peculiar charm in such a view, which secures every one who ascends a high mountain in fine weather from being disappointed; although, it must be admitted, he may have to set against his pleasure considerable fatigue, and what is more disagreeable, extreme cold. We took some mouthfuls as we stood, but agreed it was no convenient place for a meal. Before leaving the summit we plunged our sign-post firmly into the snow, and wrapped a blue apron round the projecting branches, which gave it something of the form of a cross; and, having endeavoured to secure the permanence of this our mark for a few days, we adjusted the rope for our descent.

I cannot at all agree with those travellers who think that any part of a descent is worse than the ascent. It seems to me always easier to come down than to go up; but when you are upon snow the difference is something marvellous. On the Dom, as on the Finsteraarhorn, you can choose, for considerable distances, between rocks and snow; therefore, if you struggle up on the solid rock, you will be sure to come plunging or sliding down the soft snow. Looking cautiously before us, we descended at a rapid rate, and scarcely paused till we arrived, hot and breathless, at our breakfasting place. There we again

rested; and from this point we followed exactly the same path by which we had ascended in the morning. I believe we took each way the best and shortest route, as indeed the time of our excursion would indicate. Our pace quickened as we got gradually nearer to Randa; and when we again entered the curé's parlour his clock was at twenty minutes past four. We had, therefore, been absent fourteen hours and ten minutes.

Of course, we had to give an account of our proceedings to our worthy host and some of the other good folks of Randa. We rested and conversed for about half an hour, and then started for Zermatt, which we reached in time for the evening *table d'hôte*, to which there was one traveller at least who did justice. I need not say that we were welcomed with kind congratulations. Every community has its own public interests, and a population of guides naturally finds its account in any event which gives it an additional hold upon tourists. I believe Johann zum Taugwald was regarded, in a small way, as a patriotic citizen who had advanced the glory of his commonwealth, and I am sure his own quiet satisfaction was that of a member of his village society rather than of an ambitious individual. I make this remark, because there is a peculiar interest in the simple unartificial *socialism*, or linking together of private fortunes, which prevails in the Alpine valleys. Sometimes, as at Chamouni, in the guide-system maintained there, the principle is strained till it threatens to break; but generally it does not interfere unreasonably with the convenience of travellers; and, for the people themselves it must be very healthy and beneficial.

I am sorry to confess that I have no scientific observa-

tion to contribute to geology or botany as the result of my day's climbing. It would, however, be rather hard if an unscientific lawyer or parson out on his holiday were to be forbidden to ascend lofty mountains; nor can I quite agree with the censors of such tourists that their ascents may not be useful or interesting to any besides themselves. The particulars which it is in our power to give may be of some service to travellers better instructed than ourselves, and may spread the taste for a pursuit which is as healthful to the heart and mind as it is to the body. The fellow-feeling which animates all who have once become interested in Alpine travel is my excuse and my encouragement for offering the foregoing account of an expedition so deficient in adventure, and so barren of scientific fruit, but proving the accessibility of the elevated centre of one of the finest Alpine panoramas.

I have only to add that the height of the Dom, according to Berchtold, is 14,941 English feet above the level of the sea. It may be mentioned, by way of comparison, that the heights of Mont Blanc and Monte Rosa are, respectively, 15,784 and 15,223 English feet. The Valley of St. Nicholas, at the bridge of Randa, is, by Schlagintweit's measurement, at a height of 4754 feet, so that the height to be ascended — the village being a little above the bridge — is almost accurately 10,000 English feet.

J. LLEWELYN DAVIES.

NOTE BY THE EDITOR.

The range of the Mischabel-Hörner, which is also known as the Saas Grat, includes four peaks, arranged in a line nearly due north and south, and separated from each other by a nearly equal interval of a little more than an English mile. Passing from south to north, the names of these peaks most generally adopted are—the Täschhorn, the Dom, the Gasenriedhorn, and the Kleine Mischabelhorn. M. Berchtold, the Canon of Sion, to whom we are indebted for careful measurements of the Valais Alps, has given the advantage of four metres, or thirteen feet, to the Täschhorn, over its twin-brother the Dom. Both are decidedly higher than the two northern peaks. The general opinion, however, both at Zermatt and Saas, is in favour of the superior claims of the Dom, and in that opinion M. Gottlieb Studer concurs. There remains, therefore, some shade of doubt which of the two may rightfully claim supremacy among the Alps exclusively belonging to Switzerland. It is certain that the difference between them cannot amount to more than a few feet. A small spirit level, provided with a sight, an instrument easily carried in the pocket, if carefully observed, would often help to settle such questions in regard to points moderately near *together*, of which the distance is approximately known. In the "Suggestions for Alpine Travellers," included in this volume, I have entered more fully upon this subject.

CHAP. VIII.

ASCENT OF THE FLETSCHHORN AND THE ALLELEINHORN.

THE great Pennine chain of the Alps, its numerous northern spurs, and the intermediate valleys, were till lately but little visited by travellers, in comparison with other mountainous regions of Switzerland: indeed, before the scientific expeditions of Professor Forbes, nearly the whole of this range of mountains may be said to have been a *terra incognita* to Englishmen, and known to few, besides the actual inhabitants, among the Swiss themselves.

The two largest of the northern offshoots from the principal chain, enclosing between them the long valley of St. Nicholas (somewhat in the form of a horse-shoe), and containing some of the loftiest summits in Europe, have in the last few years been extensively explored by the more adventurous in the crowd of tourists who now flock annually to Zermatt.

A little further to the east is another parallel range, at first sight appearing on the map as one of these spurs, but in reality forming part of the chain dividing Switzerland from Italy which takes a bend to the northward at the Joderhorn, east of the Monte Moro, and maintains nearly the same direction as far as the Pass of the Simplon, where it resumes its north-easterly course until it finally unites with the great central chain of Switzerland near the Pass of the Furca.

Mr Ames's route
Mr Davies's route
SAAS GRAT
and the
FLETSCHHORN
Rauthorn
Gamsa Gl.
Simpelen
Mahwald Gl.
Rossboden Gl.
Wenginhorn
Seethalhorn
Rothhorn
Fletschhorn Gl.
Fletschhorn
Bodmer Gl.
St Niklaus
Schilthorn
Laquinhorn
Laquin Gl.
Lauwihorn
Rieb Glacier
Bider
Bider Gl.
Bidermatten
Trift Glacier
Weissmies
Saas
Herbrügen
Gemshorn
Kleine Mischabel
Hohberg
Nadelgrat
Fee
Roth Th.
Weiss Th.
Portiengrat
Bisbach
Randa
Graben Gl.
Kien
Kien Gl.
Täsch
Mischabel
Fee Glacier
Mittaghorn
Almagell
Almagellhn
Rothplatt Glacier
Lehmbach
Fürgbach
Täsch
Alphubel
Allelenhorn
Allelein Gl.
Sonnighorn
NICOLAI THAL
SAAS THAL
London, Longman & Co.
Engraved by Edwd Weller

The valley of Saas—far more interesting in itself than that of St. Nicholas, though partially eclipsed by the unrivalled splendour of Zermatt—has lately attracted a considerable number of visitors, but it seems rarely to have occurred to any one to penetrate into the heart of the lofty chain, forming its eastern boundary. Studer's map shows us no less than five passes over this range, all glacier routes probably of great interest, only two of which—the Rothplatt glacier, and a depression of the Portiengrat—have, I believe, been crossed by English travellers; and though it is inferior in general elevation to its immediate neighbour on the west, it contains many high peaks, foremost amongst which are the Weissmies (the highest point of the chain), and, further to the north, the Fletschhorn, no doubt familiar in appearance, if not by name, to those who have crossed the Simplon Pass in fine weather.

This latter peak is a conspicuous and beautiful object in the view from the new hotel on the Æggischhorn, where it first attracted my attention, on a bright morning towards the end of August 1856. I had just been foiled in an attempt to ascend the Finsteraarhorn, dense mists and a furious wind having obliged me to return when about a thousand feet below the summit; and this too after waiting several days with more or less patience for a favourable change in the weather.

I was thoroughly tired of the Æggischhorn; I had no settled plan; and moreover I was alone and unhampered by appointments of definite date—great stumbling-blocks to travellers!—the majestic appearance of the distant Fletschhorn excited my ambition, while its apparently isolated position (as seen from the north) seemed to give rich promise of a splendid panorama; the ascent,

if practicable, would in some measure atone for my recent failure; and certainly two previous visits had not exhausted the wonders of the most wonderful district in Switzerland. I slept at Viesch that night, and met there a Chamouni guide who had crossed the Col du Géant with me in 1854; he had no personal recollection of me at first, but became duly affectionate when a reference to his recommendation book had established my identity.

Next day (Saturday the 23rd of August), I proceeded to Saas, and of course applied immediately to the celebrated Curé Imseng for information about the Fletschhorn; he entered heartily into the scheme, and promised to accompany me on the Monday, if he could find a clerical substitute to undertake his parochial duties during his absence. This was satisfactorily arranged on the following day.

Three Englishmen who were at the hotel agreed to join in the expedition, and in the afternoon we all went a short distance up the western side of the valley to a point from which we could reconnoitre the mountain with telescopes. It lies too far in the background to be visible from the village itself, and we now learnt for the first time that there were two peaks, both entitled to the name of Fletschhorn, though the more southerly point is also known on the eastern side of the chain as the Laquinhorn; Studer's map gives it the latter name, while the more general ones of Keller and Leuthold ignore the existence of a second peak. The northern point, whose massive white shoulders crowned by a pyramid of rock presented so striking an outline in the view from the Æggischhorn, seemed, as far as we could judge, not impracticable, but suggested considerable glacier difficulties, the true nature of which is seldom discernible at a distance. The Laquinhorn, a

serrated ridge, was apparently accessible by means of a long steep buttress of rock, leading almost uninterruptedly from the western base of the peak to its highest point, and forming a wall of separation between two glaciers which ultimately unite at its lower extremity. This spinal column (so to speak), is distinctly marked on the annexed map, which is taken from Studer's.

We had now to decide which of these summits we should attempt to reach. The higher of the two was of course to be preferred, but which *was* the higher? Opinions were divided; the point was discussed; and we separated into hostile parties, warmly supporting the rival claims of the respective favourites; but, after all, the most practised eye cannot judge with any accuracy of the comparative heights of two contiguous peaks, when viewed in highly foreshortened perspective from the base of the range. And here the curé could not help us; he had obtained from engineers engaged in the survey of the district, the heights of many of the surrounding mountains, amongst others that of the Laquinhorn (13,206 English feet above the level of the sea), but the northern point, or Fletschhorn proper, had not, he believed, been measured. He did know, however, that two years previously, a Swiss professor had succeeded in reaching the top of the northern peak from the Simplon side, while there was no tradition of a human foot having ever trodden the summit of the Laquinhorn. This was admitted as a paramount claim for the southern peak, and the two factions finally coalesced, both anxious to believe that our new Jungfrau possessed the collateral advantage of being taller than her now less interesting sister.

Franz Andenmatten, the landlord of the Monte Rosa

hotel at Saas, was to be our principal guide, a merry, good tempered fellow, and a first-rate mountaineer, and it was left to his discretion to select three others. In case of serious difficulty it would be well to have a guide for each traveller, and with so large a party the *impedimenta* were pretty sure to be considerable.

Provisions packed, and all arrangements made, we set off about five o'clock for the Trift Alp, where we were to sleep, and so reduce our next day's work by a full hour. The curé preferred a shorter night in his own bed, and accordingly remained at Saas, promising to call us at two A.M.

Instead of the two or three log tenements that usually form the cheese-making establishment of an Alp, we were surprised to find a cluster of châlets almost worthy the title of village, with a due proportion of the fair sex too, a great rarity in châlet life. Unprecedented luxury here awaited us! Unlimited "niedl" (cream), which Devonshire might have owned with pride, and which one of my companions so highly appreciated, that I am sorry to say he felt very squeamish in the early morning; a large hay-châlet for a bed-room, all to ourselves, clean, and without subterranean cows; and (Capuan effeminacy!) a mattress and bed-clothes for each. Think of that, ye ardent spirits, who face without flinching the horrors of a "Sand Alp," and don't get up the Tödi after all! Who ever heard of anything more luxurious than clean hay in a châlet! For my part I felt half ashamed of myself. Bedsteads too were there, to complete the unwonted splendour of our dormitory, though, as they were not furnished with sacking or other means of suspending the mattresses, which had to be raised on a complicated system of logs and bundles of hay to bring them up to the

proper level, the utility of these last articles of furniture was perhaps questionable.

We passed a merry evening: the make-shift seats and supper-table, the rough patois of the natives, and the misunderstandings it occasioned between us and the "Senner,"* all inclined us to mirth; the guides too contributed not a little to the general amusement by their quaint songs of native growth, after each of which they burst into a roar of laughter at their own performance; and not till they were quite hoarse did we retire to our sleeping apartment, where a candle, stuck into some extempore socket was now added to our list of superfluous luxuries.

My companions were half undressed, and I was finishing a cigar outside, when I became aware of suppressed whisperings and titterings in the immediate neighbourhood, sounds which, on further investigation, proved to emanate from a juvenile group of the female population collected at the corner of the next hut, and apparently watching with great interest the mysterious process of going to bed, as practised by the English nation generally. After a little complimentary "chaff," and one or two songs from them very fairly sung, and containing invariably some reference to a "schätzli" (sweetheart), I joined the rest of the party, undressed, and, being the last, according to the good old rule, put out the light. No sooner had I stepped into bed than a crash ensued, and I suddenly found myself half buried under a chaotic heap of disorganised bedclothes, the bolster occupying the post of honour on the top of my head. The treacherous fabric had given way at the foot of the bed, owing, no doubt, to the substratum of logs having been arranged in some position of unstable

* The man in charge of the cows, and the "sennhütte," or châlet.

equilibrium. A momentary silence of astonishment was followed by peals of laughter from my more fortunate companions, till two guides, attracted by the noise, made their appearance with a lanthorn, and commenced the work of restoration, which was soon completed in a more solid and trustworthy form, not, however, without sundry incursions of the fair sex, whose curiosity was proof against my extreme déshabille. The situation, as revealed by the sudden light of the lanthorn, was, no doubt, supremely ludicrous, but was not precisely the kind of spectacle for the contemplation of female friends, and they were repelled accordingly. It did not occur to me at the time, but I have my suspicions that those innocent damsels were privy to the catastrophe, and had of malice prepense unsettled the foundations of my couch. I may be wronging them; but, at least, this hypothesis furnishes some explanation for their otherwise inexplicable appearance on the occasion.

Notwithstanding the luxurious preparations for our repose, the incessant jangling of the cow-bells outside disturbed us considerably; indeed, one unreasonable cow, intent on the herbage in the immediate vicinity, accompanied her meal with a continuous thumping of her horns against the wall of the hut, in addition to a perpetually recurring fantasia on the bell. Our sleep being thus comparatively light, the cheery summons of the curé at two A.M. was quickly responded to, and by three o'clock we were off. The sky was quite clear, but the moon, being in its last quarter, gave but a feeble light, and we were obliged to have recourse to lanthorns. This did very well so long as our course lay up a series of grassy slopes, where it was all plain sailing, only varied by an occasional stumble against a hillock, but as we approached rough ground, where so

uncertain a light is very embarrassing, the curé thought it advisable to call a halt, till the faint indications of dawn, just beginning to be perceptible, should ripen into daylight, and in about half an hour we made a fresh start.

The wide expanse of pasture gradually narrowed to a small valley full of the large blocks of stone which from time to time roll down from above, and this again dwindled to the limits of an insignificant gully, near the head of which we turned abruptly to the right, and, as the sun rose, we were toiling half way up a long steep slope covered with débris from the lateral moraine of the glacier, which flows down from the northern Fletschhorn. At this moment, the view of the Mischabel range was very striking, as the numerous peaks were successively tinged with the first rosy light of sunrise, while a chilly gloom still reigned at the foot of the enormous precipice which overhangs the Fee glacier. This magnificent amphitheatre of giant peaks, embracing the Alleleinhorn, Alphubel, the three Mischabelhörner (or Saasgrat), the Kleine Mischabel, and the Balferinhorn, cannot be seen to advantage from the valley, nor even from the village of Fee, where the view, though exceedingly grand, is too near for a comprehensive coup d'œil. It is not necessary to mount very far; but no one, unless he climb to a moderate height on the eastern side of the valley, can form any adequate idea of this imposing group. The Trifthorn, a point crowning a spur of the Weissmies, would, if accessible, be a very favourable position for the full enjoyment of this remarkable view.

We were now beginning to perceive the true relative heights of the Mischabelhörner, about which I had had a controversy with the curé the day before, as we were dis-

cussing an attempted ascent of the "Dom" made in the previous year, the success of which, though alleged by those engaged in it, was doubted at Saas, on account of thick mists, which must have rendered it difficult for them to ascertain the position which they attained. The curé had confidently pointed out the most northerly of the three peaks as the Dom, whilst I, relying on the maps, supported the claim of the middle point, but with great deference to his undoubted topographical knowledge of this district. The higher we rose, the higher rose the middle peak, till, long before we reached the top of the mountain, he acknowledged the question of pre-eminence to be definitively settled in favour of my claimant.

A tough scramble up the moraine itself, which was unusually high, brought us to a level basin of the glacier of no great width, crossing which without difficulty, we found ourselves at the base of the great peak, and at the beginning of that long ridge of rocks which was to be our course, almost without interruption, to the summit.

At our first meal, a small tin of butter, which I had insisted on taking with us, was attacked with avidity on all sides, and my *amour-propre* was gratified by hearing the curé, who had rather pooh-pooh-ed the notion, declare that, though it was the first time he had tasted "anken" (butter) on a mountain excursion, it certainly should not be the last. The idea had been suggested to me on the Furca, by a waitress of discerning mind and great administrative talent in the commissariat department, on the occasion of a recent ascent of the Galenstock, where it had proved so desirable a condiment that I determined thenceforth always to take a supply with me on similar expeditions. If tightly packed in a glass tumbler, or any other

vessel, with a paper cover, it may be carried for hours in a knapsack without melting *, or if the surface should be a little affected by the heat, a handful of snow, or cold water (if any is to be had) will soon restore it to its former solidity. As a preventive of thirst, it is invaluable on the upper glaciers and high rocks, where no water can be found; and even where water is abundant its merits will be readily appreciated by any old traveller who knows that drinking frequently during a long ascent is a pernicious habit, more easily denounced than resisted.

I mention this, because butter is rarely thought of as an item in the provision list, and is decidedly preferable in every way to its usual substitute, cheese.

With the rocks, our work began in earnest, and for nearly four hours we were engaged in one continuous scramble up this long ridge, which, though it looked so regular from below, proved rather to resemble a series of miniature fortresses, each of which had to be scaled in turn. Not that we encountered any serious difficulty: once, indeed, we were compelled to leave the rocks (where a little water, trickling over them the day before, had frozen in the night, and left a thin coating of smooth ice, too treacherous to confide in,) and to cut steps up a slope of hard ice at the side, but that is much too common a feature in mountain excursions to be looked upon as a difficulty. Of course we came provided with a rope and an axe, paraphernalia prospectively necessary for any expedition in the higher Alpine regions, but only in this one instance did we use the axe,

* A simpler and equally effective expedient is to scoop a piece out of each lump of bread, partly filling the hollow with butter, and covering this with the outside of the piece cut out.—(EDITOR.)

and the rope was, I believe, not once called into requisition. It was, in fact, laborious climbing, and nothing more.

Some recreation in the midst of this hard work was afforded in one spot on the brink of an almost sheer descent, by dislodging huge fragments of rock, which bounded away in a series of tremendous leaps, and ran steeple-chases on the glacier below, the favourite occasionally going plump into a crevasse, and relinquishing the contest, amid shouts of derision from the spectators.

The active old curé seemed proof against fatigue, and devoted himself most energetically to the assistance of two of my companions who had not much experience in the high Alps, and made rather slow progress in consequence. Andenmatten and I were, in consequence, far in advance towards the end of the ascent, and owing to his delicate forbearance in suggesting that I should go before him for the last few yards, I was the first to plant foot on the hitherto untrodden summit.

It was just ten o'clock, and the mists which so often follow a bright morning had already gathered along the top of the range between the Gemmi and the Lake of Geneva; but all this we had seen to great advantage an hour earlier. The Bernese Alps stood out in unclouded splendour, all the familiar peaks collected in one vast group; with the aid of my small telescope I even thought I could distinguish the hotel on the Æggischhorn, where I had suffered such monotonous imprisonment. Monte Rosa of course appeared in conspicuous majesty to the south, its several summits all visible, though very obliquely seen from this point of view; and over the depression between the Alphubel and the Alleleinhorn, I could plainly distinguish the top of the Breithorn, which I had ascended the

year before. All to the right of this, as far as the craggy heights above St. Nicholas, lay hidden behind the great range of the Mischabel. The Weissmies, our immediate neighbour, was a magnificent object, a huge snowy dome surmounting an immense area of glacier, seamed in every direction with crevasses of enormous size. But no part of the view could compare in interest with the Mischabel group. So stupendous a mass in comparatively close proximity, concealed of course a great portion of the complete panorama, and allowed only partial glimpses of the great southern chain, extending to Mont Blanc; but the splendid picture presented by that immense snow-sprinkled precipice, supporting the rugged peaks of the Saasgrat and the smooth white crest of the Alphubel, merging below into the gentler incline of the Fee glacier, and relieved again by the verdure of the valley, richly compensated for the loss of all that it screened from view.*

Alas! for the Italian landscape we had promised ourselves. All, save a corner of the Lago Maggiore, and a smaller and more distant lake whose name we could not determine, was hidden by the envious mists which capped each peak, in obedience to some stern atmospheric law, apparently bent on baffling the inquisitive tourist. Rarely may one hope to see Italy from any summit of this district. The most cloudless sky on the Swiss side offers no guarantee for the clearness of the view on the other; and our case, it seems, was to be no exception to the general rule. Towards the Tyrol also extended a sea of cloud, out of which the higher peaks rose at intervals, the most conspicuous

* The little village of Fee, in the foreground, really some hundreds of feet above Saas, appeared to lie actually in the valley, the difference of level being scarcely perceptible from a high point so directly above it.

being probably those of the Bernina range, and the Ortler Spitz, though of course in so shrouded a view their relative positions and general features were not appreciable.

There was no doubt now about the inferior height of the northern Fletschhorn; there it lay unmistakeably beneath us, and we were proudly conscious of having made a judicious selection.

The summit on which we stood was inconveniently small for a party of nine. We were on the culminating point of a sharp ridge, much sharper than we could have imagined from below; immediately underneath on the eastern side was a sheer precipice of great depth, overlooking the Bodmer glacier; to the north a vast chasm, separating us from the Fletschhorn proper; to the south the ragged edge of the saddle, almost equally precipitous on either side; and to the west our sole retreat, the long and much reviled ridge by which we had come, and which now looked less steep and unfriendly in comparison with all around us. From the moment of our arrival we had been exposed to a fierce cutting wind, which, with the thermometer below the freezing point, interfered considerably with our enjoyment of the scenery, and in about three quarters of an hour reduced our mental faculties to the exclusive appreciation of creature comforts. We crouched into various nooks and crevices, each endeavouring to improvise shelter behind a rock not half as big as himself, while the curé, more wisely perhaps, retreated to a snug corner some yards below the summit; and cold meat and red wine of the Valais were then discussed with the keen relish imparted by mountain air and a low temperature. We heard afterwards that the heat in the valley had been unusually great

all day. Under more favourable circumstances we could have remained another hour with pleasure; but frozen toes sometimes prove a stronger argument than the sublimities of nature. At half-past eleven we could stand it no longer, and started for the valley.

The descent of that long rugged staircase of rock occupied little less time than the ascent, and seemed far more tedious, now that the stimulus of an unattained goal no longer urged us forward. The constant tension of the same muscles affected the knees most painfully, and doubled the apparent distance of the green slopes we longed for; a good "glissade" down a steep reach of snow would have been a most welcome relief.

I was better off, however, than my companions, who were a little affected by giddiness, and voted scrambling down precipitous crags more nervous work than climbing up, with the further difference that whereas in the one case there always remains the option of turning back, in the other the alternative can scarcely be said to present itself. The curé, with three of the guides, adhered faithfully to his charge, assisting them with great care over any awkward places; but the progress was slow, much too slow to suit Andenmatten, who is one of the most active mountaineers I have met with, and perfectly at home on difficult rocks. Seeing that I was rather more *au fait* at this work than the others, he constituted himself my special guide, and we soon found ourselves far in front.

The rest of the party were often completely hidden from us by the broken nature of the ridge, and it was curious to watch them as they reappeared (unexpectedly diminutive), in a straggling line, now standing out in clear relief against the blue sky, now scarcely distinguishable against the dark

rocks, the curé generally in front, conspicuous by his peculiar garb, picking out the best route with experienced eye. Nothing enables one so fully to appreciate the vast proportions of these mountain regions as the sudden appearance of human beings at a point apparently quite close, but in reality distant enough to reduce the figures to half the expected size. Without some such familiar objects in the scene, it is difficult, even with the aid of long experience, to judge distances with any degree of accuracy, where all around is on so enormous a scale, especially in the clear atmosphere which usually prevails in the high Alps during fine weather.

We waited at intervals for the others, but as the distance between us seemed nevertheless to increase rather than diminish, our patience gradually evaporated, and, on reaching the glacier, we pushed on at a rapid pace towards Saas. With three guides and the curé (a host in himself), and all the provisions into the bargain, my companions of course had no reason to complain of my desertion; and as I was staying at the new hotel, while they were quartered at the old "Monte Rosa," we should naturally have separated at the foot of the mountain.

My female friends of the Trift Alp had all vanished, — gone to the valley, I believe, for the rest of the week, — so that I had no opportunity of taking them to task for any share they might have had in the catastrophe of the preceding evening. I left Andenmatten packing up the mattresses, &c., and lamenting his pipe, which had been mislaid at one of our halting-places; and, in about half an hour more, at 4·15 P.M., I arrived at Saas, revelling in the prospective enjoyment of a cold foot-bath and a hot dinner.

In the evening I joined the rest of the party to discuss the events of the day and settle pecuniary matters. All items of expense, including the remuneration of the guides, were fixed by the curé, and proved extremely moderate.

The time occupied by the expedition was, no doubt, unnecessarily long. The ascent might very well be made in one day from Saas, and is really but little shortened by passing the night at the châlets of the Trift Alp; but I think the chance of an Italian view would be much increased by an early arrival on the summit, and, on this score, an hour more or less might be an important consideration. The northern Fletschhorn is rather more distant, and the time required for its ascent would depend much on the condition of the snow, and the extent of the glacier crevasses.

A more interesting expedition, perhaps, than either of these would be the ascent of the Weissmies, which probably commands much the same view as the Laquinhorn, but is several hundred feet higher, and covered, on the northern side at least, with splendid snow-fields. A Swiss tourist, indignant that all enterprise should be monopolised by the English, and determined to do something for the honour of his country, once succeeded in reaching the summit, but I could not hear of any other ascent having been made.

The curé announced his intention of writing an account of our expedition for publication in a Zurich paper, with which he occasionally corresponds, and promised that a copy should be forwarded to each of us according to the addresses which we respectively left with him for the purpose. No copy ever reached me; whether through postal default, oblivion on the curé's part, or non-publication of the nar-

rative, will remain a mystery, I suppose, till I again pay a visit to Saas.

On the 27th, I started in the afternoon, with Andenmatten and one Imseng (possibly a relative of the curé) as guides, to cross the Allelein Pass into the Valley of St. Nicholas, expecting to meet some friends at Zermatt.

Andenmatten had previously confided to me an earnest desire on his part to achieve the ascent of the Alleleinhorn, a point of the Mischabel range, conspicuous from the door of his own hotel, and one which, if the traditions of the valley could be relied on, had never been scaled by man. From a previous reconnaissance, he felt confident that the south side of the peak presented no insuperable difficulties, and I agreed to make the experiment, if time would admit of such a digression.

Our resting-place for the night was the new hotel near the head of the Mattmark See *, a convenient starting-point for several of the greater excursions, and a spot where the want of a habitable refuge had long been felt. The house was only just opened, and the walls streamed with moisture; but it was, nevertheless, a great improvement on the miserable châlet where travellers have occasionally passed the night before crossing this chain to the Valley of St. Nicholas. The year before I had crossed the Adler Pass (or Col Imseng, as Mr. Wills †

* This lake has been formed by the advance of the Allelein glacier, which has pushed its way across the valley, and some distance up the eastern side, thus opposing a natural dam to the stream of the Visp. The drainage is effected by means of a passage which the stream has worked for itself underneath the ice. A similar lake probably existed at no remote period a little higher up the valley, just above the Schwarzberg glacier, which then stretched across to the eastern side, and there deposited the immense block of green slate which attracts the notice of every traveller.

† "Wanderings among the High Alps."

calls it), starting from Saas at two in the morning, in preference to encountering the discomforts of this shepherd's hut; but, before reaching Zermatt, I felt that the three hours' march up the valley was a very impolitic addition to the day's work.

A "Fremdenbuch" was already in existence, and contained about a dozen names. One traveller had expatiated indignantly on the inconvenience of the proposed title, "Hotel du Mont Rose," and not without reason, Saas, Zermatt, and Macugnaga, having long ago rendered sufficient homage in that respect to the queen of the Alps. I suggested to Andenmatten the more distinctive title of "Gasthof zum Strahlhorn," or, if our attempt should prove successful, "Gasthof zum Alleleinhorn"; but whether any such amendment has been since adopted, I cannot say.

As there was not a soul in the house besides ourselves, I entertained no very sanguine hopes of a good supper, but was agreeably surprised by the extent and variety of the culinary resources displayed by Andenmatten. He and Imseng were both shareholders in the undertaking, and no doubt anxious to win a good reputation for the new establishment at its début in public life. Andenmatten officiated as *chef de cuisine*, and Imseng served the banquet with dignity and a wonderful solemnity of countenance, as if deeply impressed with the gravity of the occasion. It was amusing to see how his face lighted up when I expressed astonishment at the abundance and good quality of the viands, while, at the same time, he would assume a deprecatory air, and remark, with affected humility, "Ach! Herr, Sie müssen Geduld haben" (Ah! sir, you must have patience — *scilicet*, with our humble efforts). The excellence of the supper was, I believe, partly due to

the fact that a sheep had been killed some days before for another party of travellers, so that I enjoyed the rare luxury of tender mutton, and was spared the usual infliction of freshly slaughtered stringy meat.

There had been a few scudding showers of rain as we passed up the valley, and at bed-time no little anxiety was felt about the probable weather on the morrow. Some treacherous-looking clouds were still floating about in the early morning, but the general appearance was tolerably favourable, and, hoping for the best, we started soon after four o'clock with the first grey light of dawn.

After crossing the valley, here of considerable width, and interchanging salutations with the shepherd who on our approach emerged from the châlet, half asleep and very dirty, we followed a narrow sheep-path, which at first led in a zigzag course up the steep pastures on the face of the hill, and then winding along the brink of a deep ravine with very precipitous sides brought us in little more than two hours to the great basin of the Allelein glacier, a wide waste of snow encircled by the lofty peaks of the Strahlhorn, Rympfischhorn and Alleleinhorn.

The clouds had been gradually dispersing, though a few still clung tenaciously to the pinnacles of the eastern range, and a fresh breeze from the north-west, which greeted us on our arrival at the edge of the glacier, was accepted as the guarantee of a fine day. Here we halted for a few minutes and then striking directly across the glacier, followed its northern edge, at the foot of the long precipitous wall which stretches eastward from the peak of the Alleleinhorn, forming one extremity of the semicircular Mischabel range. The crevassed state of the glacier in its central portion rendered it impossible to adopt a more

direct course. We tied ourselves together, as in duty bound, but the precaution was almost superfluous, the snow being so hard at this early hour (half-past six) that the nails of our boots scarcely left an impression on the surface. It grew softer of course as the sun rose higher, but not to an inconvenient degree, and in fact was just deep enough to afford us a firm footing on the last steep slope, where we might otherwise have been obliged to cut steps. Under such favourable circumstances we made rapid progress, and reached the summit of the pass at half-past eight. When Mr. Wills crossed this pass with the curé, they were compelled, on account of deep fresh-fallen snow which concealed the crevasses, to skirt the glacier on the other side, at the base of the Strahlhorn; a course which involved much extra ascent and descent, and occupied nearly five hours, though the actual distance is scarcely greater than that of the route which we followed.

The view from the summit of the pass, though grand, was rather contracted towards the west, the Mischabel range on one side, and the rocky spur called the Rympfischwäng on the other, allowing only a small portion to be seen of that splendid series of peaks ranging from 12,000 to 15,000 feet in height, which pour their vast ice-streams into the head of the Nicolai Thal. The most striking summits were, however, included, viz. the gigantic pyramid of the Matterhorn, the most wonderful object in Switzerland, and the exquisitely sharp peak of the Weisshorn, 14,813 feet above the sea, according to Berchtold. Close to us on the south rose the craggy peak of the Rympfischhorn, which we scrutinised with critical eye, and finally pronounced inaccessible; to the left of it appeared the beautiful white slope of the Strahlhorn, and between them an old friend, the Col of the

Adler, some 500 feet higher than our own position. East of this again were the still cloud-capped summits in the neighbourhood of the Monte Moro, and beneath us that great glacier basin over which our route had lain.

The provision knapsack now became an object of great interest. Andenmatten merely snatched a few mouthfuls, and leaving Imseng and myself to enjoy a more leisurely repast, started off alone to explore the way, and ascertain whether the ascent were practicable. In about twenty minutes we heard a shout from above, inarticulate to my ears, but partially intelligible to Imseng, who interpreted it as a favourable report; and having hastily repacked the provisions, we followed the track of our pioneer, leaving everything behind except one indispensable bottle of wine. Our course lay up a long steep incline of snow, wide at the bottom, but narrowing gradually to a ridge, which fell away abruptly on the right, and sloped less steeply on the left towards a hollow ice-ravine, full of very dangerous-looking crevasses. The snow was here rather hard, as it lay on the western face of the mountain, and had not yet felt the influence of the sun's rays: consequently the footsteps which Andenmatten had made, chiefly by kicking as far as possible through the crust without using the axe, were scarcely secure; but by occasionally digging out a good step with the points of our alpenstocks, we managed to avoid any serious slip, and reaching the top of the snow ridge in about three quarters of an hour, found ourselves on a narrow saddle near the extremity of the southern spur of the Alleleinhorn. Here a faint shout reached our ears, and looking up we discovered Andenmatten standing on an apparently inaccessible pinnacle of rock, and gesticulating signals to proceed.

This seemed to be no easy task. The rocks rose abruptly before us in a fantastic pile of enormous blocks, the lowest of which—its smooth surface slanting over towards the above-mentioned ravine, while an almost sheer precipice precluded all chance of passing round it to the right—presented a formidable barrier to our progress. It was the only possible route, however, and we clambered carefully over it, availing ourselves of the slight inequalities in the rock, as footholds, and then crept for some distance along narrow ledges on the eastern face, towards the bend of the spur, where the upper rocks became gradually less precipitous. This was giddy work, though the footing was not really insecure; beneath us the slope grew rapidly steeper, and at the distance of a few yards curved completely over, conveying the startling impression that the loose rocks which our feet occasionally dislodged, and which slid out of sight in a moment, probably took but one leap on to the Allelein glacier, many hundreds of feet below. A morbid inclination too, which I could not resist, to gaze into the awful depth, and imagine the sensation of falling, set all my nerves in vibration, and impelled me sometimes to clutch convulsively at the rocks above for support. At one moment I sat down, fairly overcome with dizziness, and told Imseng to recall Andenmatten if possible. He went forward some distance, and a shouting communication took place between them; but luckily Andenmatten was not one of those guides who are only too glad to avail themselves of any pretext to turn back; he was evidently remonstrating at the notion of a retreat. Meanwhile my spasm of nervousness passed away, and having inserted the precious bottle of wine into one pocket of my shooting-jacket, and into the other a flask of some horrible

spirituous compound belonging to the guides (both of which Imseng had left with me when he started in pursuit of Andenmatten), I scrambled on, though somewhat embarrassed by the left hand bottle, which bumped with suicidal pertinacity against the upper side of the precipice. The worst, however, was passed; the wall of rock gradually receded, and the ascent became once more practicable. In half an hour more we joined Andenmatten, who was waiting for us on the top of the ridge, and from here there remained only a gentle slope of snow to the summit, which we reached soon after eleven o'clock.

Andenmatten's pet object was now attained. He cheered and "jodelled" enthusiastically, exclaiming at intervals, "Der Herr Pfarrer sucht uns gewiss mit dem Spiegel"* (I'm sure the curé is looking out for us with his telescope); and seeing a quantity of loose rocks lying on one side of the peak where there was no snow, he called on us to assist him in building a "steinmann" (cairn), as a memorial of the ascent, and a palpable refutation of any doubts that might be thrown by envious tongues on our achievement.

Having raised it to the height of about four feet, we wedged in a long upright stone for a finish, and were then glad to take shelter behind it, for the north-west wind, which had chased away the clouds for us in the early morning, had now become our bitterest enemy. It was piercingly cold, and despite the invigorating contents of the bottle, which had passed unscathed through all the perils of the ascent, we could scarcely remain half an hour for the enjoyment of the view, though one of the finest perhaps to be found in the Alps.

We were now far above the Rympfischwäng, and from

* Spiegel, "mirror," a word often used in Switzerland for telescope.

Monte Rosa to the Weisshorn, except a very small portion still intercepted by the Rympfischhorn, the whole of that magnificent semicircle of peaks and glaciers lay glittering before us under a cloudless sky. First came the actual chain of Monte Rosa; the massive white Lyskamm and Zwillinge, the precipitous face of the Breithorn, and the small black point of the Petit Mont Cervin, descending in regular order to the snowy plain of the Matterjoch or Col de St. Théodule. Over this, at the distance of fifty miles, rose the majestic mass of Mont Blanc; a little further to the south-east, the needle-like point of Mont Iséran, and the glistening snow-field of Ruitor, marked the line of the Graian Alps on the confines of Savoy, and behind these appeared a group of still more distant peaks, including perhaps even Mont Pelvoux in Dauphiné. Next in order was the Matterhorn, towering still 1400 feet above us, and more imposing than ever; to the right of it the Zmutt glacier and the Col d'Erin, beyond which the eye wandered over a series of lofty summits in the Pennine Chain to the Grand Combin, a conspicuous feature in the background; and to the right of this again was a rugged wilderness of snow and rock, including the Rothhorn and Gabelhörner, and stretching northward to the culminating point of the Weisshorn. Here the distant view was intercepted by the great snow hump of the Alphubel, and the still loftier summits of the Mischabel, a continuous chain of precipices, sweeping round the head of the Fee glacier, which lay in a semicircular basin several thousand feet beneath us; and emerging at the extremity of this amphitheatre, the highest peaks of the Bernese Oberland formed the northern boundary of the panorama.

The village of Saas was of course plainly visible at our

feet, and with my telescope I could trace our path up the long steep ridge of the Laquinhorn; but towards Italy and the Tyrol the view was entirely obscured by the masses of cloud which had settled obstinately on all the mountain tops in that direction.

As soon as the wine was finished, I wrote our names and the date of the expedition, as well as my stiffened fingers would allow, on a scrap of paper, which was stuffed into the empty bottle, and thus securely deposited for the benefit of posterity in a niche of our pyramid; and we then commenced the descent, which proved much less formidable than I anticipated. I have often noticed the same fact in similar situations; one is apt to suppose that what is difficult to ascend must be still more awkward to descend, but it seldom proves so; partly, perhaps, from the difficulties being known, and partly because no doubt can arise as to the necessity for surmounting them; but, on this occasion, I think some virtue must be ascribed to the red Valais wine, which had infused a little extra courage before starting. The worst bit of all was the large smooth rock which had been our first difficulty during the ascent; great care was requisite to avoid slipping, and being launched down a steep gully which terminated in a network of crevasses far below. The long incline of snow was now soft enough; we sank a foot deep at every step, and I much regretted the absence of a pair of gaiters which I had obtained with some difficulty at Saas, and which I had been foolish enough to leave on the col, thinking they would be useless in the ascent of the peak. It was one o'clock when we reached the spot where the knapsacks had been left; we had still a long way before us, and, after a hasty meal, started at a rapid pace towards

the Valley of St. Nicholas. My boots were already full of half-melted snow; nevertheless, I put on the gaiters, thus shutting the stable door after the horse was stolen, according to the old proverb, which the guides highly appreciated when translated to them, but I found them very serviceable on the long reaches of deep wet snow which we had to traverse before finally leaving the glacier. I noticed, as Mr. Wills did, that the Saas men much preferred the rocks to the crevassed glacier, a predilection in which I did not at all sympathise, though, being always in a minority, I felt obliged to submit. Neither rocks nor crevasses, however, delayed us much, and we reached the village of Täsch before five o'clock. Here we parted with Andenmatten, who was anxious to return as quickly as possible to Saas, and intended to proceed as far as St. Nicholas the same evening. He is undoubtedly one of the best guides to be found in Switzerland; a cheerful companion, and the most active mountaineer I ever saw, ready to carry any weight, and to embark *con amore* in any new and difficult enterprise. I have heard my opinion corroborated by a friend who has since crossed with him the eastern range from Saas to Zwischbergen.

I offered to dispense with Imseng's services also, but he insisted on carrying my knapsack to Zermatt, where we arrived about six o'clock, in time for a comfortable toilette before the general supper.

I think Mr. Wills must have unintentionally exaggerated the height of the Allelein Pass, which he estimates at more than 13,000 feet. I do not know what altitudes may have been taken of the Mischabel group, but assuming the height of the Dom to be 15,000 feet, one could hardly assign a greater elevation than 13,800 to the Alleleinhorn,

and the pass must be nearly 2000 feet lower; it can scarcely be above 12,000 feet. The Strahlhorn is nearly of the same height as the Alleleinhorn, and much more accessible; when the snow is in a favourable condition, I believe it can be ascended in about an hour from the Adler Pass, and in some respects the view is probably finer. Monte Rosa and its great glaciers, the snowy regions of the Weissthor and the Cima di Jazi, and the lesser glaciers towards the Monte Moro, would be seen to greater advantage, no doubt; but I think the Rympfischhorn, which is 200 or 300 feet higher, would obstruct much of the view in the direction of the Weisshorn, and the grand precipices of the Mischabel would be almost wholly excluded from the panorama. At all events, it behoves me not to depreciate my peculiar protégé, the Alleleinhorn, the successful ascent of which has afforded me many a pleasant reminiscence, and has caused the 28th of August, 1856, to be marked with a white stone in my calendar.

E. L. AMES.

NOTE BY THE EDITOR.

Owing to a confusion as to names, it is not easy to understand the heights given in Ziegler's Catalogue for the range east of Saas. He makes the Laquinhorn a synonym for the Weissmies, which is said to be but thirteen metres, or forty-three English feet, higher than the southern Fletschhorn, or true Laquinhorn, ascended by Mr. Ames. This, according to the same authority, is 108 metres, or 354 feet, higher than the northern peak. I had been previously disposed to come to the conclusion expressed by Mr. Ames, who has had so favourable an opportunity for forming a judgment, that the Weissmies is

considerably higher than the Laquinhorn. It is high time to introduce this neglected giant of the Alps, who is entitled to take rank somewhere near the Jungfrau, to the notice of Alpine travellers. Observations with a barometer and even with boiling water, if carefully executed, would help to determine the height of a mountain which deserves more attention than it has hitherto received.

The heights of the peaks and passes between the Mischabel Hörner and the Weiss Thor seem to have been somewhat overrated by recent travellers, but there is a little uncertainty about the measures executed by Berchtold, and this is not likely to be removed until the completion of the Swiss Federal Map. In Ziegler's Catalogue the height of the Allelеinhorn is given at 4060 metres, or 13,320 English feet. If this be correct, the height of the Allelein Pass must be less than 12,000 feet. The same authority makes the Strahlhorn 354 feet higher than the Rympfischhorn, and 708 feet higher than the Allelеinhorn.

CHAP. IX.

THE SCHRECKHORN.

> "This most steep fantastic pinnacle,
> The fretwork of some earthquake—where the clouds
> Pause to repose themselves in passing by."—BYRON.

IT was upon a bright day, the first of the month of August, 1857, that I stepped from the deck of the steamer at the upper end of the lovely lake of Thun, and with a young companion who then journeyed in Switzerland for the first time, wended my way through the village of Unterseen to Grindelwald. Once more I was about to tread the snows of the Alps, and I felt a thrill of delight at the thought, that those only who have experienced the fascination attending a glacier expedition can fully understand. With what exultation did I gaze at the gigantic Jungfrau, the advanced guard of the Oberland Giants, whose summit I had attained the year before, and with what pleasure, as we approached Grindelwald, did I draw my companion's attention to the grandeur of the scene as mountain after mountain burst upon the sight, and gradually the whole Bernese range, from the Jungfrau to the Wetterhorn, opened to the view; the snow-clad peaks sharply defined against the clear blue sky, the glaciers pouring into the valley wherever channels in the rocky barrier gave them outlet.

At Grindelwald I took up my quarters at the Hôtel de l'Ours, where I was warmly welcomed, and was soon in

Grindelwald
Eiger
Little Schreckhorn
Great Schreckhorn
Lower Grindelwald Glacier
Zässenberg
Eiger Gl.
Mönch
Giessen Gl.
Jungfrau
Rothhal
Gletscherhorn
Trugberg
Walcher horner
Finster Aarhorn
Finster Aar Glacier
Lauter Aar Glacier
Unter Aar Glacier
Ewige Schneehorn
Mieselen
Grimsel Hospice
Thierberg
Ober Aar Glacier
Ober Aarhorn
Rothhorn
Rothhorn
Grünhorn Lücke
Wallser
Viescherhorner
Viescher Gl.
Faulberg
Ahnen Grat
Lötschen Lücke
Dreieck
Aletschhorn
Middle Aletsch Gl.
Thistelhorn
Schienhorn
Thorberg
Greater Aletsch Glacier
Aeggischhorn
Nieder Wald
Gr. Sidelhorn
Little Sidelhorn
Oberwald
Obergestelen
Munster
River Rhone
Rockingen
Gluringen
Map of the
GLACIERS
of the
OBERLAND

conference with my old guide, Christian Almer, to whom I unfolded my desire to attempt the ascent of the Schreckhorn. Finding him nothing loth, I engaged him and Peter Bohren as guides for the expedition, and the next day, with my telescope in my pocket, I mounted the Faulhorn to reconnoitre. It happened to be a *fête* day, and I found a large crowd of peasants dancing and amusing themselves in various other ways upon a flat piece of ground just below the summit. Truly, they had chosen a magnificent ball-room; the blue canopy of heaven was the ceiling, the earth — carpeted by the emerald sward patterned with the brightest flowers — the floor. On one side rose the summit of the Faulhorn, on the other the mountains of the Oberland, forming a panorama upon which the eye never tired to dwell.

Approaching a group of dancers, I was recognised by one of them (a guide I had once employed), and no sooner was the dance over than he greeted me with great cordiality, and urged me to dance a polka. As an inducement, he introduced his blushing sweetheart for a partner; but, mistrusting my powers of dancing in boots with soles an inch thick, studded with hobnails, I bowed my excuses, and proceeded on my way to the summit, where I sat down, and, adjusting my telescope, took a long and anxious survey of the Schreckhorn and the surrounding snows.

The result was that I felt convinced that the principal difficulties in the attempt to ascend the peak would be found a short distance below the place where it first appeared above the snow, as the névé there seemed much broken up, and I could trace a large crevasse running along for a considerable distance. I inferred that a long ladder would be of essential service during the expedition.

Upon descending, I communicated to Almer and Bohren the result of my observations; but finding that they did not agree with me as to the necessity for a ladder, I deferred for the time to their judgment, and having engaged two porters, awaited patiently the appearance of continued fair weather in order to start.

The morning of the 5th of August proved very fine; the mercury of the barometer was rising fast; and the weather seemed so settled that I determined to set off. The guides and porters were summoned, and we were soon in the midst of the bustle of preparation.

Each of our porters carried one of the long baskets of the country, wide at the mouth and narrow at the bottom, attached to his shoulders by hooks or cords. These baskets were filled with provisions, wine, some blankets, a large bed curtain for a flag, a sheepskin, and knapsacks. The loads were very heavy, but the sturdy Oberland men walked off with them without the slightest difficulty, and quite as a matter of course. Almer carried a long stout rope and a heavy common wood axe, which I had often seen used with good effect during an ascent, in giving the first rough cuts to the steps in a steep ice wall, that were afterwards deepened and finished off by the ice axes of those who followed. Bohren carried his knapsack and ice axe. Past experience having satisfied me that the guide, in De Saussure's time, who talked of travelling over a glacier with a parasol in one hand and a scent bottle in the other, was a very sensible fellow, and that on the snow the heat of the sun by day was worse than the cold by night, I had studied to adopt such clothing as, whilst being light and not absorbing the sun's rays, should at the same time preserve the person from cold when resting after being

heated by exertion. My costume consisted of white flannel cricketing trowsers, and a jacket of the same material, with sleeves, a white linen coat, flannel shirt, white felt wideawake hat, a pair of merino stockings, with a pair of the thickest worsted socks drawn over them, and double soled blucher boots, specially made for the purpose in London, the soles, of course, well studded with nails. I also took with me a pair of long cloth gaiters, to put on at night, and a pair of neutral tint spectacles, with side glasses, to protect the eyes from the glare of the sun whilst on the snow.

About ten we started, everyone about the hotel turning out to see us off, and expressing good wishes for our success. A short distance from the hotel we met Madame Bohren, who brought a copper kettle for our tea-making, and a little "Toddle," who came to take leave of its father. Some time was taken up whilst Bohren tied the kettle on the top of his knapsack, and gave up to his wife his testimonial book and valuables.

I myself caused the next stoppage, for notwithstanding the opinion of Almer and Bohren about the ladder, I had thought of nothing else since leaving the hotel, and pictured to myself so vividly the annoyance I should suffer in case the expedition should fail for want of it, that I sent back one of the porters to fetch one, with a man to carry it, and we awaited his coming at the residence of Bohren's father, a châlet at the foot of the upper glacier. When the ladder arrived, it required a little trimming at the ends, then there was some wine to be drunk for the good of the house, and one of the porters had to deposit his little stock of money with Bohren's sister; but at last all

these little matters were completed, and we set off in earnest.

Our course was for some time in the direction of the Great Scheideck, along and up the base of the mountain marked "Oberberg" in the map *, there being no practicable way to ascend along the southern or Grindelwald side of the upper glacier. As we passed through the meadows close to the rock, some peasants were busy getting in hay, and one of them, a young girl, was singing gaily at her work. Far above us I could see a small patch of snow, near which I was informed we should turn round the corner of the rock, and take a direction in a line with the glacier. We had started so late that the sun was very hot, and we wound our way slowly upwards, the guides and haymakers shouting to one another, and the maiden's song sounding merrily in the clear air; but at length the patch of snow was reached, we turned the corner of the rock, the shouts of the men and the song of the girl sounded fainter and fainter in the distance, and soon ceased to be heard. As the sounds died away, I felt that we were now fairly severed from our fellow-men, and a sensation of sadness stole over me. My companions also seemed to feel the change, and their gaiety ceased for some minutes.

We pursued our way steadily, the scenery increasing in grandeur at every step, as we advanced up the gorge through which the stupendous mass of the upper glacier forces its way into the valley. At one part, our path lay over a large mass of rock, beautifully rounded and smoothed, most probably by glacier action, but a few rude steps had been cut by the shepherds or hunters in continuation of the path,

* It has not been possible to include the Upper Glacier of Grindelwald in the map engraved for this volume.

and there was no difficulty in passing. With the exception that Almer pointed out four chamois, on the opposite side of the glacier, that were grazing upon a patch of grass amidst the snow, no particular incident occurred until we neared the upper end of the glacier, when the noise of falling water warned us we were approaching a cascade, and we were soon in the midst of a scene of wild beauty. A large waterfall and several smaller ones, fed by the snows of the Wetterhorn, poured from the summit of the ragged cliff on our left hand, and their waters forced their way amongst the rocks with thundering din on their passage to the shattered glacier below.

To save making a long detour, our ladder was put in requisition, in order to cross the stream from the great waterfall close to the fall. During the fixing of the ladder, I was surprised to see a stone fly suddenly past us, close to the head of one of the porters, and we soon discovered that the fall brought down quantities of stones which, striking upon the basin into which the water fell, were shot out obliquely with tremendous violence. This discovery quickened our movements. As soon as the ladder was fixed Almer and Bohren crossed, and I followed, my legs getting wet through in a moment from the spray, and having a narrow escape from a stone, which struck the brim of my hat whilst climbing the opposite bank. We were watching the passage of the porters, when suddenly I perceived the foremost stagger, having evidently been struck by a stone. The poor fellow just managed to totter up to us, when he sank upon his knee with his face covered with blood from a bad cut in the head. I immediately pulled out my brandy flask and poured the contents down his throat; and recollecting the rule laid down by the renowned borderer

Dandie Dinmont, in "Guy Mannering," that "the best way's to let the blood barken upon the cut," I would not allow the wound to be washed; but bound it up as it was with a pocket handkerchief. The guides relieved him of his burden, and washed his face, and in a little while we had the satisfaction of seeing him, although weak, revive sufficiently to be able to go on.

After some rough walking and climbing over the rocks, we rounded the cliff on our left, and reached a place on the summit somewhat approaching a level. A short walk brought us in front of a huge boulder, or rather a cluster of boulders thrown together, and here the guides halted and, pointing to a hole close to the ground, informed me we had arrived at "The Chief Hotel." *

The baskets and knapsacks were immediately put down, and preparations made for coffee. Bohren, who was of a restless disposition, and had lingered behind poking the handle of his ice axe into all the crannies he could find, came running up to tell us that in one of them he had touched a marmot. Most men are by nature Nimrods; and there are few that the prospect of a chase after even a rat does not excite. Shaking off my fatigue, and seizing an empty bag and an axe, I ran to the spot with Almer, and we all three were soon engaged with the axes, digging like madmen to get at the poor marmot; but although we tore up the turf and stones for some distance, and actually arrived at its bedchamber under a large flat

* This hole or cave, is, I believe, the same used by Mr. Wills during his ascent of the Wetterhorn. I think that, without reference to an ascent, two or three days might be most agreeably spent by using it as head-quarters, and making excursions from it to the neighbouring rocks and glaciers. The scenery around is magnificent.

boulder, the marmot was too quick for us, and opened a way out before we could reach it.

After the hunt, I made a sketch of the Schreckhorn, enjoyed a good meal and a cup of coffee, then lay down upon the sheepskin with my knapsack for a pillow, and covering myself over with a blanket was soon fast asleep.

THE SCHRECKHORN, FROM OUR SLEEPING PLACE.

When my companions retired for the night, Bohren roused me up, and tried hard to persuade me to enter their burrow under the rock; but I did not like the look of it, so, finding me determined to stay where I was, he disappeared with the others, crawling backwards through the hole, and I once more settled to sleep.

I was awakened about one in the morning by thunder, and, poking out my head from under the blanket, I found that it was raining fast. Up I jumped, rolled up my bed,

placed it at the mouth of the hole, and bawled to the guides to take it in. After some sleepy observations from within, the bundle disappeared, and, lying down upon my face, I backed in after it. I found the hole more capacious than I had imagined, and, passing to the end, enjoyed a good rest.

In the morning it was still raining, and after taking breakfast my companions went to sleep again. I arranged the sheepskin at the entrance of the hole, and passed an unpleasant day, lying with my head out like a marmot, by turns dozing and watching the weather and the Schreckhorn, which I could see from my resting place.

Late in the afternoon the rain cleared off, my companions shook off their lethargy, and we all turned out to look about us. As we stood with our backs to our resting-place, the Wetterhorn was on our left, the Schreckhorn on our right, whilst in front rose a rocky barrier, up which we had to climb in pursuing our route. Almer determined at once to climb this barrier, until we reached a spot within a short distance of the point where we were to take to the ice, and there to pass the night, so as to make a good start in the morning should the weather prove favourable. As anything was better than the monotony of our present position, I was glad enough when we packed up our traps and bade adieu to our hotel, which certainly possessed one great recommendation, that there was no maître d'hôtel to present his bill, and no garçons to levy backsheesh upon the guests.

After climbing to the height desired we found an overhanging rock, under which we took up our quarters. The guides and porters built a little wall round us to keep out the wind, and we kindled a fire and made a good meal of

coffee, ham, and eggs. Bohren found a little hole in the rock higher up, which he said just held him, and the three porters found one lower down, so the four betook themselves to their bed-chambers, and I was left alone with Almer.

We kept up our fire, and as I did not feel any inclination to sleep, I sat up for some time, with a blanket round me, smoking my pipe and musing upon my strange situation. Almer kept me company, as he refused to lie down unless I did. When we did lie down, I found that little Bohren had carried off the sheepskin, and I had several times to rise and remove sharp stones whose points stuck into my back and rendered sleeping impossible. To add to my discomfort, the rain again began to fall and was driven in upon me by the wind, which was very cold, so that at length I was glad enough to get up again. Wrapping my blanket around my shoulders, I sat down and anxiously watched the flying clouds. On my left hand, as I sat with my back against the rock, in tantalising proximity rose the Schreckhorn. When a cloud less dense than others passed before it, its outline became dimly visible, and at the same time showed that the moon was shining brightly behind it, her light piercing the thin veil of cloud, and for a moment touching snow and glacier with her rays. Looking straight before me, I could mark in the distance the noble outline of the Niesen, and, as if suspended in mid-air, a small speck of light, which I felt sure must be the reflection of the moon shining upon the lake of Thun. The clouds flew rapidly past, gradually becoming thinner and fewer, until by degrees the stars became visible, the rain ceased, and about two A.M. the moon was shining in a cloudless sky. The Schreckhorn on my left, and the

Wetterhorn on my right hand, stood out in bold distinctness, the snows around them looking like frosted silver; and the distant lake of Thun quivered and sparkled in the moonlight.

Almer replenished the fire and made a good supply of coffee; as soon as it was ready we shouted to wake Bohren and the porters. After considerable exercise of our lungs, some faint holloas announced that Bohren in the attic, and the porters on the ground floor, were awake; but it was a long time before the lazy fellows would turn out. As soon as we were assembled, breakfast began; and after it was over we packed up such things as we considered necessary to carry with us, and leaving the rest behind, at half past six o'clock we left our resting-place.

Above us extended a long ridge of perpendicular rock, with the glacier resting upon its summit and forming a continuation of its face; but never projecting far beyond the edge, as the moment any portion of the ice was forced by the pressure behind beyond the edge, it broke off from the main body and plunged down the precipice. I was fortunate enough to see the fall of an enormous mass, which went thundering down, striking projecting points of rock, and turning and bounding until it reached the rocks below, where it was shivered into thousands of fragments, throwing up a perfect cloud of icy spray.

The cliff seemed to bar further progress; but at one point there was fortunately a depression over which the glacier flowed, and from that point we soon made our way to the ice above, where a striking scene awaited us. On our right, deep below, ran the main channel of the great glacier, on our left, far above us, and shutting in the view, was a long jagged ridge of huge ice pinnacles which

gradually descended, bearing to the right until it terminated at a point abutting on the main channel, the portion of the glacier upon which we were standing being magnificently crevassed. To the before mentioned point we directed our steps, but the crevasses were so large and numerous, that it was extremely difficult to thread our way amongst them, and it somewhat taxed Almer's sagacity to find a route. Several times we had to abandon the path we were following, and try another; but by perseverance we arrived at our point, and shortly afterwards reached the névé.

We found ourselves in the centre of a valley of snow, with a gentle inclination upwards. The passage amongst the crevasses had so engrossed my attention that I had been unable to look about me, but now I observed for the first time, that instead of a single peak, as the Schreckhorn had always appeared to me to be, there were two distinct peaks. I was perfectly puzzled, and pointing to the nearer, I asked what it was. "Schreckhorn," was Almer's reply. "And that?" I said, pointing to the farther and higher. "Schreckhorn," was also the reply.

I could only suppose that from the points of view whence I had hitherto regarded the Schreckhorn, the higher peak had been blended with, or hidden by, the lower one. I of course determined to try the higher.

The valley in which we stood terminated in a ridge, for the most part covered with snow, dividing the upper glacier of Grindelwald from the Lauter Aar glacier. Straight before us, however, and at the near side of the col, was a portion of bare rock, which formed a conspicuous object in the distance, and seemed a spur of the higher peak of the Schreckhorn, projecting from the snow in the

same manner as one sees portions of the roots of large trees projecting from the soil, far from the stem they support. We marched past the lower peak, and made straight for this mark, the sun struggling through the clouds and shedding a watery glare around, whilst the whiteness of the snow on the peaks, showed that, unfortunately for us, it was fresh fallen. Before us to our left was a dome of snow, with an alpenstock planted in the top of it by one of a party who had lately reached this rarely visited spot. As we advanced our mark appeared larger and larger, until upon coming up to it, I found it was a very large frontage of rock with a quantity of fragments at its base. To the right ran a steep wall of snow, forming one side of a great crevasse or *bergschrund*, the opposite side of which was much higher, and rose from the edge in a steep slope. The crevasse cut us off entirely from the peak.

We all stood for some time staring at the rock and the crevasse, and as no one seemed inclined to take a decisive step, I marched off to the left of the rock, with an idea of taking the difficulty in flank. Almer and Bohren followed, but I had not gone far when they begged me to stop, and Almer shook his head, and led the way back again. I have always regretted since that I did not persevere, as we could not have met with greater difficulties than we afterwards encountered.

Away we then went to the right, examining the crevasse carefully as we went along, but for some time there appeared not the slightest chance of crossing. After a close examination, however, Almer hit upon a place where he determined to attempt the passage, and the ladder being set up, I mounted with him and Bohren to the edge of the crevasse on our side.

We had scarcely done so when an avalanche of fresh snow descended from the slope on the opposite side. Lucky it was for us that we had not crossed! The larger portion of the avalanche fell into the crevasse, whilst the remainder poured steadily over us like water. It came down with a sound like the prolonged dwelling with the voice on the word "hush." Directly I felt it coming I struck the handle of my ice axe into the snow and held on, crouching on my knees as low as possible. I was blinded by the rush of snow, and thought at the moment we were all going to be covered up. By the time it ceased I was pretty nearly in that predicament; I was obliged to pull my head out of my hat, leaving the latter in the snow, with large lumps of which, like hods full of mortar, my back and shoulders were covered. The snow also filled my pockets, and clung in lumps to every part of my flannel clothing. Bohren and Almer were in a similar plight. We had just finished clearing off the snow when a smaller avalanche fell, and we again went through the clinging process. This was too much, and the moment it ceased, we hastily cleared off the snow, and ran down our ladder as fast as our legs could carry us.

Almer now gave it as his opinion that if we crossed the crevasse and tried to climb the slope, we should dislodge the fresh snow and be swept by it into the crevasse; and, as this was very evident, and it would have been nothing short of madness to have persisted in a proceeding that would have risked the lives of the entire party, I was obliged to relinquish the attempt to ascend the main peak.

It was with deep disappointment and a heavy heart that I saw the failure of my hopes, and turned to survey the lower peak, to which Almer drew my attention.

No crevasse appeared in our way, and as Almer felt sure we could mount it, I agreed to try.

From where we were standing a gentle descent conducted us to the bottom of a small valley running up between the peaks. We crossed this, and began to ascend the opposite rise, bearing to the right towards a mass of rocks forming a buttress to the right side of the lower peak, and divided from it by a steep slope of snow.

We had not proceeded far, when we had another proof of the dangerous state of the snow. An avalanche, dislodged from the upper part of the valley near the base of the peak, came suddenly down, sweeping a track about fifty feet in width and passing so close to us that I touched the edge of its track with my axe. The effect was wonderful. First was heard the noise I have before described as the snow began to slide from its bed, and then, as the mass gathered increased velocity by its fall, a sort of crackling crunching sound, as the snow was pressed into huge balls which tore rents in the surface as they rolled along.

As the avalanche passed me its force was nearly spent; but our ladder man, who was some distance below me with the ladder over his head and his pipe in his mouth, being in its way, it took him off his legs and rolled him over, ladder and all, amidst the laughter of the party.

After this incident we left the ladder on the snow, and lost no time in gaining the buttress of rock where we were safe from avalanches. We climbed to its highest point, and then the axes came into play to cut steps in the icy slopes leading thence to the base of the peak. Scarcely any snow rested upon this peak; it was more perpendicular than the adjoining peak of the Greater Schreckhorn, but consisted of rock much broken up by the frost, with

angular grooves affording good hold for the hands and feet, and rendering it not difficult to climb. We arrived at its summit at three P.M.

I immediately exposed a thermometer on the highest point; we planted our flag, and drank a bottle of wine, and Almer and Bohren set to screaming as loud as possible.

For some time the clouds had been gathering around us, and the view was anything but inviting. The only objects (and those only occasionally) visible were our neighbours, the higher Schreckhorn peak, and the Wetterhorn, which presented a very remarkable appearance, having a conical top of fresh white snow, in shape exactly like a Mandarin's hat. The clouds filled the valley, and were massing themselves in a manner that betokened bad weather.

After smoking my pipe and chatting with Bohren for some time, I suggested that instead of returning by the way we came, we should try to descend the opposite side of the peak, and proceed to Grindelwald by the lower glacier. Almer and Bohren at first expressed some doubts about the practicability of this course, but eventually agreed to try it.

Before leaving, I took up my thermometer, which marked 43° Fahrenheit, and wrote our names on a piece of paper, which I placed in a bottle, and left for the edification of those who might come after us. It was in vain that Bohren attempted to persuade the porters to return the way they had come; they would not leave us, and we all quitted the summit together.

The first portion of the descent was extremely steep; masses of the broken rocks were piled up here and

there, wherever a shelf allowed them to accumulate, and great care was required in passing over them. They were carefully surveyed by Bohren, who kicked over any fragment that appeared dangerous, and sent it plunging down to the depths below, frequently setting others on the move during its course, until a perfect avalanche of rocks was formed, which we watched as they crashed along until lost to sight in the distance. I found that I got on best by placing my hands behind me and crawling down on all fours with my back to the rock, and I used this mode of progression wherever the rock was too steep to allow of my walking upright. When we came to a place a little less steep Bohren walked upright, and looking back, encouraged me to do the same, saying, "One never slides upon granite, Sir;" but the words were scarcely out of his mouth when the little man came down upon his back in a manner that made me infinitely prefer my surer method.

We certainly during our descent saw nature in her most gloomy and sterile aspect. Nothing but rock! rock! bare rock! There seemed no end to it. Once only I remember that the scene was varied, when a change took place in the mineral character of the rock, and we passed from the granite, too constantly disintegrated by the frost to permit of vegetation forming upon it, to a formation which, by its composition or the direction of its cleavage, is more capable of resisting that mighty leveller of the high places of the earth. There the cliffs were clothed with lichens of the most beautiful and varied colours, affording a charming relief to the eye.

As we continued to descend, we came now and then to small plateaux, the summits of fresh precipices, down which a passage had to be found. It was upon reaching one of

these that Bohren, approaching the edge of the precipice and peeping over, shouted out, "Un chamois!" and immediately the whole party was thrown into a state of great excitement. The animal, it appeared, was lying down upon a ledge of rock, whence it started off the moment it saw Bohren. It took at first a downward course out of our sight; but Bohren directed me to watch the side of the aiguille near us, and in a moment or two it came bounding up the rocks like an arrow, scattering the loose stones in all directions. It was within easy gun-shot range when, a short distance above us, it suddenly turned to the left along a narrow ledge crossing the face of the cliff; but when it arrived at the end of the ledge it was stopped by a precipice, which compelled it to retrace its steps, after which it continued its upward course, and was soon lost to view.

At one spot we found ourselves in a complete fix. Our progress, like that of the poor chamois, was stopped by a precipice, and it seemed at first that we must turn back; but peeping round a projecting rock we saw a ledge on the other side, and determined to reach it if possible. It was an ugly place; the face of the rock went sheer down some hundreds of feet, and you had, whilst clinging to the rock, to cast one leg round it, and feel for a resting place for the foot. As we were not tied a slip would have proved fatal. Happily we all got round safely, and after this we but once more encountered any serious peril. That was in passing a tall cliff topped by a glacier, whose ice pinnacles here and there stood out over the edge, and appeared ready to fall. There was no other way to go, and we all hurried along as fast as the steepness of the rocks would allow, keeping as close to the cliff as possible. My companions

seemed fully to appreciate the danger. Many a wistful glance was cast upwards, and I felt very glad when we had left the place far behind.

We had here a fine opportunity for observing the wonderful operation of nature in the gradual reduction of the rocks. In descending from the top, it was curious to perceive how the fragments became smaller and smaller, until we arrived at a depth where they were fairly reduced into earth covered with patches of grass and wild flowers. These patches became more frequent and larger until the whole mountain side was clothed in verdure, and we drew near to the glacier.

It was a welcome sight, for, as we approached its side, the shades of evening began to fall; but we now felt sure of reaching Grindelwald, and put forth our energies in scrambling over the long line of loose boulders which had to be traversed before we trod the ice. When at length we attained the object of our exertions—the Lower Glacier of Grindelwald — it began to rain, which made the passage over the ice miserable work, and by the time it was over we were thoroughly wet through. We left the glacier at the point where visitors to it usually get upon the ice, and I observed that the features of the place were much altered since I had last visited it. Early in August of the preceding year, 1856, a deep chasm lay between the ice and the rock, and access to the glacier was obtained by first walking along a plank supported by two pegs driven into the face of the rock, and then along another plank which led thence to the ice, but on this occasion the glacier had moved much closer to the rock, and the peg-supported plank was no longer necessary.

The rest of our journey was wretched in the extreme.

It was quite dark when we passed through the fields leading to the hotel; the rain fell in torrents, and we arrived perfectly drenched. However, a warm bath and a good night's rest set me right, and when the rain continued, and two days afterwards I saw the sides of the Eiger and the Wengern Alps covered with snow, I congratulated myself upon having escaped so well.

EUSTACE ANDERSON.

NOTE BY THE EDITOR.

The first recorded attempt to ascend the Schreckhorn was made by MM. Desor and Escher von der Smith in 1842. They started from the Pavilion on the lower Aar glacier, and ascending by the second of the tributary glaciers that descend from the Greater Schreckhorn to the Finsteraar branch of the Aar glacier, they succeeded in gaining the highest ridge of that peak. M. Desor describes it as forming an excessively sharp edge of bare rock of a crescent shape, about 300 yards in length, the highest points being at the two extremities. The southern of these alone was attained on that occasion, the connecting ridge being so shattered that they were unable to reach the northern summit, which, according to M. Wild's triangulation, is about ninety feet higher than the other. As far as I know, this point has never yet been ascended, and I would suggest that the attempt should be made from the side of the Lauteraar glacier. Sleeping at the Pavilion, it would be practicable to start long before daylight, and to arrive at the foot of the peak at a much earlier hour, and with less fatigue, than when approaching it from the Grindelwald side, even after passing the night in the uncomfortable position where Mr. Anderson made his second bivouac.

During the bad weather which Mr. Anderson encountered,

unusual heat prevailed in the north of Switzerland. At noon on the 5th of August, the thermometer stood at 66° Fahr. at the Ober Sand Alp, over 6000 feet above the sea. At ten A.M. on the 6th, the temperature at Wesen on the Lake of Wallenstadt, was 76°·2 Fahr.; and at noon on the 7th, at Immensee on the Lake of Zug, 77°·3; in each case the thermometer being carefully shaded.

The exact height of the Greater Schreckhorn has not, perhaps, been satisfactorily ascertained, but Desor's observations on the subject are erroneous. In Ziegler's Catalogue the height given for the point attained in 1842, there called the Eastern Peak, is 4082 metres, or 13,392 English feet, while the Western Peak is said to be but 4014 metres, or 13,170 English feet in height. M. Desor supposes that these measures were intended for the two summits forming the extremities of the ridge of the Greater Schreckhorn, but Ziegler's statement of the latitude and longitude of each point shows that the Western Peak of his catalogue is the Lesser Schreckhorn ascended by Mr. Anderson. These are the results of the triangulation executed by Eschmann, and independently of other causes of error, there is much difficulty in securing the identity of the particular point in a broken ridge, such as the summit of the Greater Schreckhorn, that is observed from the two extremities of a base line.

True granite has not been observed anywhere in the higher region of the Oberland Alps, and it is probable that the rock so named in the foregoing paper is gneiss, which at intervals, as described by Mr. Anderson, passes into mica-slate.

CHAP. X.

THE GRIMSEL TO GRINDELWALD.—PASSAGE OF THE STRAHLECK.

THIS is one of the most interesting of glacier excursions, and in fine weather offers no serious difficulty to a moderately good mountaineer. The ascent of a remarkable peak is a more exciting enterprise, some passes present single scenes more striking and impressive, such, for instance, as the views from the summit of the Weiss Thor, or the Monte Moro; but if I were consulted by a friend, condemned to spend but a single day in the higher regions of the Alps, who sought in that one day to store up for the remainder of his life the richest collection of sublime and varied pictures of the ice world, my choice would certainly rest between the Col du Géant and the Strahleck. It is a recommendation to the latter, that there is a far less risk of encountering unexpected difficulties, involving delay and possible disappointment. Although it has been well described by Mr. Hinchliff in his "Summer Months among the Alps," I am led to imagine that an account of a passage effected some years ago under rather peculiar circumstances, may deserve a place in this volume.

Leaving England in September, 1852, after a very hot summer, well remembered by those who were engaged in the general election of that year, I reached Zurich on the 13th. At the excellent Hotel Baur, an acquaintance familiar with the establishment took me into the sitting-

room of the proprietor. Seated at a card-table were Mr. Baur himself, a Prussian Baron X., a banker from Basle, and a fourth whom I forget. Champagne glasses and bottles, some empty, some not yet opened, were at hand. My guide assured me, that for several successive years the same party had met in summer at the hotel. After the one o'clock table-d'hôte, they sat down daily to whist, and the winnings were invariably spent in champagne—no bad arrangement, by the way, for Mr. Baur. Three of them were bloated, unhealthy-looking men, the fourth, pale and emaciated. On leaving the room, I had a glimpse of the lake and the range of the Albis, and I thought to myself how wonderfully diverse are the tastes of human beings.

I have found it a good plan, on first arriving in Switzerland, to arrange two or three days' gentle walking on some of the easier mountains or passes, so as to train the limbs before undertaking longer excursions. A man fresh from the streets of a city, finds his first ascent of a mere hill more fatiguing than the longest day's walk will be, ten days later. The Rigi answers as well as any other mountain that can be chosen for a first afternoon's walk. No degree of familiarity can lessen the beauty of the panorama, and the precaution of telegraphing beforehand for accommodation, gives a tolerable chance of a room at the Rigi Kulm, even in the crowded season. A traveller who in two or three days, from London, has reached Basle or Friedrichshafen, may now easily dine the next day, and spend his evening on the summit. In 1852 things were not so far advanced as they are now, and the great ugly stone building of the new hotel at the Kulm had not been commenced. The visitors were packed tight in the old

wooden house, where the Englishmen, who tried to move about in the crowded coffee-room, invariably knocked their heads against the great beams that crossed the roof.

The ascent from Arth was very hot, and by the time I had succeeded in shaking off the swarm of guides and guidelings that persecute every traveller who wishes to be independent, I was glad to slip off my coat and to find that I was not singular, as others whom I met also complained of the unusual warmth of the evening. As constantly happens in the Alps, this heat was the precursor of rain. Next morning the dawn broke with a Scotch mist, which gradually settled into a steady drizzle, that became thicker and heavier as I descended the soft slippery track to Kussnacht. Throughout the evening and night, and all the following day, the rain fell in Lucerne with scarcely a moment's intermission, and it was reported that the roads and bridges throughout the canton had suffered severe damage. Growing impatient, I resolved that, come what would, I would start the next day for Meyringen.

The morning of the 17th was as wet and dreary as the day before, but I was fortunate enough to find an agreeable companion in the steamer, bound, like myself, for the Brünig. By the time we reached the top of the pass, the rain, which had been falling perseveringly all day, began to moderate, and at the point overlooking the valley of Hasli where the paths to Brienz and Meyringen separate, it had ceased altogether; and the clouds, still dense and threatening, hung over the valley with their under surface about 6000 feet above it. I had several times had occasion to remark in this same district, that it is a great mistake to suppose that there is nothing to be seen in a mountain country in bad weather. Many of the grandest and most

impressive moments that stand out amongst my recollections of the mountains, have been unexpectedly gained during bad-weather expeditions. I think it very unwise to undertake high and difficult excursions at such a time, but, in summer at least, a practised mountaineer may face the worst weather over the ordinary frequented passes, with an excellent chance of coming in, where he least expects it, for some new aspect of nature that will remain indelibly impressed upon his memory. So it befel me this evening on the Brünig. The steep range that closes in the Hasli Thal to the southward was seamed with foaming torrents that leaped down in a succession of cascades. Several, that I had never before noticed, had swollen to the dimensions of the Reichenbach; and the noise of a hundred waterfalls fell upon the ear at first confused into a single distant roar, but by close attention it seemed possible for the ear to resolve the sound into its several component parts. The level floor of the valley presented an extraordinary appearance. The Aar and each of the torrents that goes to join its course, had overflowed their banks in many different places, and formed new streams that spread out over the plain, widening as they advanced, till in one part more than half of its breadth was under water.

From the western horizon, over the lake of Brienz, some brighter evening light came slanting in between the heavy roof of clouds and the wild confusion of the waters below, that here and there reflected the rays up to where we stood. The scene would have helped an artist who was engaged in an illustrated work upon the deluge. I could not see the bridge over the Aar below Meyringen, and I forgot to ascertain afterwards whether it was carried away or not.

In any case it was useless to think of reaching the Reichenbach Hotel; and after parting from my companion, who was bound for Brienz, I made my way without much trouble to the Sauvage at Meyringen. It rained again during the night, and the next morning broke gloomily. I had nearly resolved to give up my projected excursion — which included a visit to the chain of the Steinhaushorn and Mährenhorn on the north-east side of the upper valley of Hasli, some examination of the glaciers near to the Grimsel, and the passage of the Strahleck — when, as I sat at a late breakfast in the hotel, I perceived a break in the clouds that had never opened for three entire days. At a great height above this rent in the lower stratum, were light fleecy clouds, that travelled rapidly to the southward, while the current below, as uniformly happens during wet weather in summer, moved lazily to the northward, impelled by the Föhn — the south or south-east wind — so hateful to hunters and tourists in the Alps. I inferred from the strength of the northern upper current a speedy return of fine weather, and dismissing the disagreeable alternative of making my route by Brienz and Interlaken, prepared for a start up the valley of the Aar. It was too late — nearly ten o'clock — and the weather still too unfriendly, to attempt the ascent of the Mährenhorn, of which Mr. Gottlieb Studer has given an interesting account in his *Topographische Mittheilungen*. I therefore resolved to go to the Hospice of the Grimsel, and on the way to make a slight détour to the Urbach Thal.

On the preceding evening the usual passage of the Aar opposite Meyringen had been utterly impracticable, the river had become a torrent, the most furious and formidable that I have yet seen. It was perfectly startling to watch

the shocks that were repeated whenever the large blocks of stone hurled along by the flood encountered any fixed obstacle in the bed or the banks of the river. On the next morning the stream had subsided to something like its usual condition, and the ferry was re-established. Following the usual path as far as the summit of the Kirchet, I then took the track to the left towards the Urbach Thal. My time did not allow me to go far in this wild and striking glen, from which on either side steep rocks rise abruptly as from a lake. A day would be well spent in exploring it to its upper extremity, which is filled by the Gauli Glacier, whence there are practicable but difficult passes to the Lauter Aar Glacier and to Rosenlaui. Returning to where the Urbach Thal opens out some hundred feet above the plain — once a lake-bed — of Im Grund, I took a very faint track to the left, hoping to make a short cut to Guttanen, rather than follow the ordinary mule-path that crosses the Aar, and again returns a few miles farther on, to its left bank. I had the usual luck of those who take short cuts in the Alps; you gain a more interesting and more fatiguing walk, but are very fortunate if you don't lose a good deal of time. My track disappeared after a few miles, and one torrent was near causing me a long circuit, but I was able to find a spot where it could be jumped.

About Guttanen the weary rain began again, and held on till, after a passing glimpse of the Handeck filled to thundering, I reached the Grimsel Hospice after dark, well drenched, and somewhat tired from fast walking, while yet unused to exercise and to the knapsack. I was most kindly received by the host, old Zybach — Vater Zybach, as the frequenters of the Grimsel used to call him — and by his well-looking, good-humoured daughters. My

knapsack being scantily furnished, I was glad to borrow a suit of the old man's dry clothes, little suspecting that a few weeks later the owner would be a convicted felon. The account of his crime given in Murray's Handbook is possibly correct, but it does not quite agree with the stories afterwards told to me by two natives of the valley of Hasli. Towards the end of October, or about five weeks after my visit, Zybach, according to his usual custom, descended the valley to pass the winter in Meyringen; some of his family were left to follow, and a solitary man was to be stationed as caretaker, and to receive casual guests through the winter. Late in the evening of the next day several of the village magnates were sitting together at Meyringen over their pipes, when an unusually bright light became perceptible in the direction of the head of the valley. Zybach, who was one of the company, at once expressed great alarm lest the Hospice should have taken fire, an accident that seemed very improbable to the others present. It was arranged that a party should start for the Grimsel, along with Zybach, early on the following morning. In the meantime, however, the fire had become known in the upper part of the valley of the Rhone, and long before the Meyringen party had accomplished the seven leagues which they had to travel to the Hospice, a number of country people from the Valais had assembled, and in endeavouring to put out the fire, some of them accidentally turned up a quantity of linen, glass, and other household property, concealed under heaps of rubbish near the Hospice. On his arrival at the spot, the culprit was confronted with these proofs of his guilt; further evidence was soon forthcoming; and this man, hitherto so respected, was taken back a prisoner. According to my informants,

it was proved that not long before he had insured to a large amount the property contained in the house, and he counted not only on securing this money, but also on having a new and more considerable building, to be erected at the cost of the canton. Certain it is that he was sentenced to a long term of imprisonment, which, if he survives, he is probably still undergoing. Dark stories were afloat as to the disappearance of travellers who had passed the Grimsel late in the year, and I believe that attempts were made to drag the *Todtensee*, whose name helped to favour these gloomy reports, for which no evidence, nor even reasonable ground for suspicion, was produced.

With no uncomfortable misgivings, I sat down to my evening meal in the sitting-room of the old hospice. The room being warm, I took the end farthest from the fire, near to which at the other extremity of the long table were two travellers, the only occupants of a chamber constantly crowded in summer and autumn. As I supped, they were taking tea and conversing in a low tone. I had opened Studer's *Mittheilungen*, which I have found the pleasantest travelling companion in the Bernese Overland, when I perceived by the louder tones of my companions that they were engaged in some rather angry discussion,—and as it became impossible not to hear, my attention was at length fixed by their conversation. They spoke English, but with a marked accent which showed that one was a German, the other a native of the United States. The discussion amused me so much that I made a note of it, which I now transcribe.

G. "Then I think we had better separate; after this it is impossible for us to go on together."

A. "With all my heart; the less I see of you for the future the better pleased I shall be."

G. "Very well; you can go whichever way you please in the morning, and I shall go in the opposite direction."

A. "It's all alike to me, so long as I get rid of your company."

G. "Ah! I always suspected you."

A. "What for, I should like to know?"

G. "I remember well what you said one day in Heidelberg."

A. "And what did I say in Heidelberg?"

Here the voices fell, and for a while I heard nothing distinctly. My curiosity was excited, and as the voices rose again, I listened, and found that the matter of dispute was neither of the common topics—politics or religion—but the theory of the Glaciers. The German held what was then the orthodox faith at Heidelberg—the views published by Agassiz—while the American spoke of them and their author in the most irreverent tone, I fear even calling the latter a humbug. It appeared that they were old friends, who had both come from America to pursue their studies in Germany. The notion of men quarrelling for life on such a ground struck me as something new, and I thought I might succeed in reconciling them. In answer to an inquiry of mine whether they had ever seen a glacier, they told me that they had been that day to the foot of the Aar Glacier, but had seen very little, owing to the bad weather. I suggested that they might wish to see something more, and in the course of the evening it was agreed that they should go with me on the following day up the Sidelhorn, and from thence pay a visit to the Oberaar

Glacier, and that on the day after, weather permitting, we should pass the Strahleck to Grindelwald.

The following day, the 19th, was very unfavourable; occasional rifts in a stormy sky showed from the summit of the Sidelhorn the Oberaar Glacier and Col, and the wild range of mountains at either side of the Gries Pass; but except a little botanising under difficulties, (for rain, but no snow, continued at intervals during the day,) there was little to be gained either in the way of interest or instruction. Despite the appearance of the weather, I continued to believe that a change must be at hand, and accordingly made all preparations for the expedition of the following day; but I decided upon not going to sleep at the pavilion of Mr. Dollfuss, as the hut is called which was built by that gentleman upon the steep bank of the Lower Aar Glacier, to replace the inconvenient and dangerous temporary dwelling on the medial moraine of the same glacier wherein M. Agassiz and his friends passed a considerable portion of three successive summers engaged in their arduous glacier observations and experiments. In point of fatigue I have never found that anything is gained by sleeping, or rather trying to sleep in a hut, where, without the luxury of a bed, one has an unusual proportion of those small animals that sometimes haunt that article of furniture. Two or three extra hours' walking are well compensated by a good night's rest. The case is quite otherwise when there is a good chance of finding the snow of the upper region hard by starting from a nearer point; but with cloudy weather, and the thermometer at the Grimsel standing at over 50°, there was no chance of the fresh snow being frozen, and I made up my mind that we must encounter a large amount of this rather formidable ob-

stacle. Another excellent reason for sleeping at the pavilion was wanting; the appearance of the weather forbidding any expectation of a night view over the Glacier of the Aar such as Mr. Hinchliff was fortunate enough to obtain. I cannot help thinking that as soon as travellers are more generally aware of the marvellous beauty which the ice world assumes in its night aspect, lit by the full moon or by the more mysterious light of the stars, they will oftener undergo the trifling inconvenience of indifferent night quarters at any of the numerous points now available for such a purpose. Even those who would avoid the comparative difficulty of such an excursion as that to the Grands Mulets or the Tacul, may attain their object by passing a night at the pavilion on the Aar Glacier, the Johannis Hütte on the Pasterze Glacier, or the châlets of the Zäsenberg or the Mettenberg, over the lower glacier of Grindelwald.

At about one o'clock in the morning I looked out; the night was unusually dark; the clouds lay thick about the Grimsel, and it rained slightly. At three we all rose: the general opinion was against our chance of success; but, as all the arrangements were made, I urged that we ought to try the experiment, being at the same time quite determined to return unless the weather should be decidedly favourable. I had been reading Studer's account of his unsuccessful attempt to make the passage in 1839, and had no desire to expose myself or my companions to the inconvenience and suffering which he experienced. Upon my assurance that I should require no personal assistance, and that I was used to take my turn of ice-work in case it should be necessary to cut steps, we started with two guides only — young Zybach, the son of the host, and an

older man, whose ability was not such as to induce me to preserve his name. We had a stout rope, which I generally carry with me strapped to my knapsack, in preference to relying upon the worn-out articles that are sometimes provided. A ladder, as we were told, had been left near the foot of the Strahleck by a party who had crossed during the summer.

At half-past four we started, the old guide leading the way with a lanthorn; and I cannot recollect ever setting out on any mountain excursion with a smaller prospect of success. The sound of water trickling on all sides, and the occasional splash of a foot into a pool or rivulet, helped to increase the impression caused by the thick damp clouds that surrounded us. With an occasional stumble from one or other of the party, we made our way to the foot of the Lower Aar Glacier as the approach of day began to make itself perceptible through the surrounding mist. As we advanced on the lower part of the glacier the light rapidly brightened, until suddenly, as though by enchantment, the entire mass of cloud rolled itself back, and in less time than I can write the words, the great glacier and its surrounding peaks stood before us unstained by a single speck of vapour. Before us, as we looked up the main reach of the glacier, stood the range that extends from the Abschwung to the Schreckhorn. To the right we had the chain of rugged summits that include the Rothhorn, the Mieselen, and the Ewigeschneehorn; and to the left the parallel chain of the Thierberg and the Zinkenstock. Each of the higher summits glowed in the light of the rising sun; the dark blue sky overhung the valley, filled by the glacier still grey in the shadow of the masses of cloud piled up behind us that were fast retreat-

ing towards the Grimsel. Those who have experienced the combined effect of grand glacier scenery with the return of sunshine and colour to the earth after many days of gloomy weather, can alone conceive the effect of so glorious a morning.

All doubt about our success being now removed, it was agreed that we should push on as rapidly as possible over the easy portion of our route that lay between us and the foot of the Strahleck. Having somewhat strained one foot in the course of my hurried walk two days before, I found that I could not go fast so early in the day, but I felt sure that, before the difficulties commenced, I should overtake my companions, who, in the meantime, advanced rapidly along with the guides, leaving me to enjoy by myself the exquisite beauty of the early morning. Though I had never traversed the glacier before, the writings of Agassiz and Desor had made me familiar with the ground which had been the scene of labours prolonged with rare perseverance throughout three successive seasons. In crossing the medial moraine I stopped a few minutes to admire the extraordinary dimensions of the blocks that compose it, and then advanced along the southern side of the glacier towards the point of meeting of its two great tributaries, the Lauteraar and the Finsteraar Glaciers. This meeting is effected in a rather unusual way, and deserves some notice. A glance at the map will show that these glaciers are formed in the two valleys lying between the three parallel ridges, whose highest points are, respectively, the peaks of the Ewigeschneehorn, the Schreckhorn, and the Finsteraarhorn. Towards their origin both glaciers flow in the same direction, and, if the confining ridges were sufficiently prolonged, the Finsteraar Glacier

would have found an outlet in the valley of the Oberaar Glacier. But on that side its course is barred by the range which connects the Thierberg with the Finsteraarhorn, while the abrupt termination of the chain of the Schreckhorn, in the promontory of the Abschwung, allows the accumulated ice of the Finsteraar to flow by a lateral passage into the adjoining valley of the Lauteraar. The forces, whatever they may have been, that have elevated the chief masses in this part of the Oberland Alps into sharp jagged ridges directed from west-north-west to east-south-east, do not extend far. Somewhere about the head of the Oberaar Glacier they seem to have been modified by those far more widely spread agencies that have given a prevailing west-south-west and east-north-east direction to the principal ranges of the Swiss and Pennine Alps, and to the main valleys that lie between them.*

The ascending slope, which is extremely gentle on the lower part of the Unteraar Glacier, becomes somewhat steeper on the Finsteraar branch, and I could perceive that

* The valley of the Rhone is bent a little from its direct course, between Leuk and Brieg, by the insertion, parallel to the main chain, that extends from the Dent de Morcles to the Mönch, of the little explored range which includes the Aletsch Horn and the Nest Horn. With this slight exception, a line drawn across Switzerland, from the Rhone below Martigny, to the Rhine near Coire, crossing the unimportant transverse ridges of the Furca and the Ober Alp, will be found to lie altogether in the valleys of the Rhone, the Reuss, and the Vorder Rhein. Parallel to this great line of valley, we have, omitting minor instances, first, the line from Interlaken to Kussnacht, along which are the lakes of Brienz, Lungern, Sarnen, Alpnach, and the northern arm of the lake of Lucerne; and, farther north, that bounded by the Jura range, and occupied by the lakes of Neufchatel and Bienne, and by the course of the Aar, from Büren to Brugg. Southward again, the same direction is preserved, in ascending the Val Bregaglia from Chiavenna, and descending over the low pass of the Maloya for seventy miles of the Valley of the Inn, nearly to Landek in Tyrol; and in the Pennine Alps we find it again in the Valley of Chamouni, the Allée Blanche, the Val Pellina, and the Val Anzasca.

owing to this, and the appearance of numerous crevasses, my companions had slackened their speed, so that I soon overtook them. We here came upon the névé, but to my surprise there was no appearance of fresh snow. I had already been struck with the fact that on the Grimsel, and even on the Sidelhorn, we had, on the previous day, encountered rain instead of snow, whereas on former visits, during bad weather, I had found deep snow at the Grimsel in August. The thermometer, during the preceding thirty-six hours, had not fallen below 47° Fahrenheit, showing that the current from the south, whose over-charge of aqueous vapour had caused the heavy rain of the last five days, had maintained a temperature unusually high even for the height of summer. This was the real cause of those destructive inundations which made the month of September, 1852, long remembered in many parts of Switzerland and Savoy. Such inundations would be far more common, if the enormous fall of rain in the lower valleys of the Alps were not neutralised by its being converted into snow in the region of the higher mountains and glaciers. The usual supply from this latter source is greatly diminished at such times, and though the small streams are swollen, the great torrents that issue from the glaciers are reduced to less than half their usual volume. But the case is very different when rain several degrees above the freezing point falls upon the great fields of ice and névé. The whole of it goes to swell the glacier streams, and, moreover, the entire of its surplus heat is consumed in melting the ice and snow with which it comes into contact. After endeavouring to estimate the prodigious amount of water that, under such circumstances, must be carried down within a few hours into the prin-

cipal valleys, I was not at all surprised when a few days later, in ascending from Sallenches to Chamouni, I found bridge after bridge swept away—some of them seventy or eighty feet above the usual level of the water—and masses of stone and rubbish brought down, sufficient, in one instance, to bury a house and mill so completely that only a small portion of the latter, and the roof of the building, remained projecting from the surface.

In ascending the lower part of the glacier, our course was directly towards the Finsteraarhorn, which towered into the sky more and more grandly as we approached, and at the point where, after rounding a projecting spur from the Schreckhorn, the valley turns abruptly to the right, or north-west, quite losing sight of the previous portion of the track, the peak presents one of the grandest objects to be found in the Alps, or, I believe I might add, in the world.* The Monte Rosa, from the Macugnaga Glacier, is more colossal; the Aiguille Verte and the Aiguille du Dru, from Mer de Glace, and the Glockner, from the Pasterze Glacier, are perhaps more beautiful in form; but from this sequestered spot, to which no sound or sight of the lower world can penetrate, the view across the fields of névé, lying level and unbroken to the very base of the dark precipices that reach upward to the summit of the mountain, is unique of its kind. The impression that arises is that of some landlocked fiord in a tideless frozen sea, over which broods for ever the shadow of the Peak of Darkness.

We pressed onward into the branch of the valley that leads close to the crags of the Schreckhorn, and it soon became manifest that the pass must be effected by ascend-

* The view of the Finsteraarhorn in the Frontispiece is taken from a point lower down on the Finsteraar Glacier, near to its confluence with the Lauteraar branch.

ing an extremely steep ridge of snow that closes in the head of the valley, at the only point where it is not shut in by walls of rock, so steep as to be nearly, if not quite, impracticable. We now reached the fresh and soft snow, and veils were in requisition. The ascent became gradually steeper, as was evident when one of the party dropped his alpenstock, which shot down the slope with marvellous rapidity; a little farther we were at the very foot of the well known ice wall of the Strahleck and we prepared to commence the work of the day.

We were all tied together; there was no thought of cutting steps, for the fresh snow was soft and very deep, so that there was scarcely any visible appearance of the wide crevasse or *bergschrund*, which forms the chief difficulty of the ascent: but it was all the more necessary to be prepared for the possibility of the snow-covering giving way. I took the lead, as I was anxious to test a mode of mounting steep slopes of soft snow, which I may venture to recommend as advantageous in such cases. You hold the alpenstock horizontally with both hands, the point being turned to the left side, and thrust it forward, with a somewhat oblique movement from right to left, so as to bury it in the snow transversely, at about the height of the chest. However soft the snow may be, this affords a tolerably solid support upon which to press with the hands, in order to gain footing for the next step. Such a plan is required only where the slope is very steep, as is the case at the Strahleck. Two practised mountaineers describe it, indeed, as "nearly perpendicular;" but this expression is often used rather loosely, and, in this case, may stand for an inclination of 60°, a slope which, as those who have tried it are aware, is indeed formidably steep.

The crevasse was passed in safety and without serious difficulty, though a slight subsidence of the snow as I was over it made me feel well pleased that I had a stout rope round my waist. Beyond this we came upon rocks, steep, but no way difficult; then again upon fresh snow, and soon after the chief object of our expedition was attained—we were upon the ridge of the Strahleck. It is altogether a scene of the ice world, for the distant glimpses of the lake of Thun and the plain of Switzerland are scarcely regarded; the attention is absorbed by the immediately surrounding objects, which are scarcely to be exceeded for wildness and grandeur. Especially striking is the great ice basin from whence descends the lower glacier of Grindelwald, overhung by the Walcherhörner, or Grindelwald Viescherhörner, and the ridge that connects these with the Mönch and Eiger. Neither from this, nor from any other point that I have attained, have I been able completely to unravel the intricate topography of the region west of the Finsteraar Horn. It is asserted by Desor that the uppermost part of the glacier field now before us flows over the depression between the Mittelgrat and the peak immediately west of the Finsteraar Horn, which has been named the Agassiz Horn, thus feeding at once the Aar and the Grindewald glaciers. This I believe to be a mistake, but the point should be decided by some one who may reach the Strahleck early enough to spare two or three hours for an excursion along the Mittelgrat. While I was engaged in pointing out to my companions various facts connected with the structure and movement of the glaciers, the guides summoned us to our mid-day meal; and as the wind was rather sharp, we were glad to nestle in a sheltered corner, under the rocks of one of the

chief buttresses of the Schreckhorn that rise abruptly from one side of the pass. This rock disintegrates more easily than is common at so great an elevation. Desor has called it mica slate, but I apprehend that this name is rather loosely applied in the Alps to rocks of whatever age that have undergone metamorphic action, and that the so-called mica slate and gneiss of this part of the chain belongs to some of the secondary formations underlying the Jura limestone.

I had with me no barometer, nor the means of boiling water, and can neither confirm nor dispute the measurement of MM. Agassiz and Desor, which greatly exceeds the height deduced from preceding observations. Their result is 3,355* metres, or 11,007 English feet. From a comparison with the neighbouring summits, which have been measured trigonometrically, I should have thought that the height could not exceed 10,000 feet above the sea level.

There has been some discussion about the origin of the name Strahleck—sunbeam corner—but, on the spot, the explanation appeared to be obvious. The Grindelwald shepherds, who feed their flocks in summer on the Zäsenberg, an oasis in the ice desert below us, are shut out from the rising sun by the range of the Schreckhorn, and the first rays of morning reach them over the ridge of the Strahleck. The Zäsenberg is the only spot inhabited, even in the height of the summer, that is visible from the place where we stood, and from these shepherds it must have received its very appropriate name.

We had reached the top about eleven, and, at the urgent request of our guides, prepared to start again before mid-

* A subsequent reduction gave 3371 metres, or 11,060 English feet.

day. The first part of the descent being very steep, the rope was once more in requisition, and we commenced the descent with fresh-lighted cigars, which I had served out. I was obliged to lead slowly, as my companions cried out whenever I attempted to hurry, and looking back, after two or three minutes, I found that every man, guides included, had let his cigar go out. The steepest part was soon passed, without meeting any *bergschrund*, such as one of Desor's companions fell into; then came a few rocks, and below these a long incline of snow, rather steep, but tempting for a *glissade*. The snow, however, was rough and lumpy, perhaps owing to rain having fallen even at this great height. In such a state of the snow it is difficult, and not very safe, to glide in the usual standing posture, and I prefer the less dignified plan of sitting upon my plaid, steering with the alpenstock. Our American comrade, who attempted the same operation, and tried to check his velocity with his feet, as beginners often do, soon found himself flying down head foremost, at a disagreeably rapid pace. Young Zybach was fortunately able to stop this uncomfortable mode of "going ahead." We did not follow the course described by M. Desor, whose party crossed the upper part of the glacier to the foot of the Zäsenberg. Under the guidance of Zybach, we kept all along as much as possible to the right side of the glacier, where, under ordinary circumstances, there is no other difficulty than arises from a passage down some very steep rocks, where the guides, insisting that a person who did not know the spot could not find a footing, required that each of the travellers in turn should be let down with the rope passed under his arms. We were going on at a moderate pace, unapprehensive of further difficulty, and

expecting to arrive immediately at the châlet of the Mettenberg, where I was anxious to examine with some care the vegetation of the surrounding rocks, when our progress was suddenly stopped in a quite unexpected way.

At a point where the glacier abuts against the rock, and it is necessary to pass from *terra firma* to the ice, there is in general but the trifling difficulty of scrambling up the steep edge of the glacier; but the lateness of the season, and the effect of the heavy rains, had combined to make the glacier shrink very much within its usual limits. When we reached the place where it is customary to step from the rock upon the ice, we found that we were at the top of a vertical wall, ground smooth by the passage of the glacier, now fallen in a shattered state twelve or fifteen feet below us, and leaving a space many feet wide between the ice and the rock. Here and there projected some edges and pinnacles of the broken glacier, one or two of which reached within five or six feet of the wall near to where we stood; but after the heat of so bright a day they were in a crumbling and rotten condition, and the boldest man would not venture to trust his weight to so frail a pedestal. We were upon a sort of promontory, and further progress along the side of the glacier was quite impracticable, the rock becoming absolutely precipitous. The case began to look awkward. After casting about for a while, and seeing no outlet towards the glacier, I thought of attempting a passage in the opposite direction, by climbing up some very steep rocks behind us, and seeking a mode of descent on the other side towards the mass of the Mettenberg. I had got a good way up the rocks until I found that it was nearly impossible to clamber farther, when I turned round to see what my companions below were about. They were

scattered along the brink of the glacier, seemingly in rather hopeless mood, when suddenly I observed young Zybach spring from the edge of the rock and disappear from sight. The others hastened to the spot which he had left, and their alarmed and excited gestures showed that they thought something serious had happened.

I descended as fast as I could, and soon joined them. They shouted loudly, receiving, of course, no reply, and pointed out a *crevasse* in the edge of the glacier, down which they declared that Zybach had disappeared. I must own that I was at a loss to understand the proceeding, though I could not feel any alarm about so bold and active a mountaineer as young Zybach had shown himself; but I was well pleased when, after a short time, we saw him scramble up out of a *crevasse* some sixty or seventy yards from where we stood. He was quite unhurt, but much begrimed with the white glacier mud, and soon made his way towards us. Selecting one of the projecting pinnacles of ice that approached nearest to the rock, he proceeded to cut away the upper crumbling surface with his pole-axe, and on reaching the solid ice within, he cleared out two or three footsteps in the slippery edge. There was now a secure place on which to rest the foot; a short striding jump from the rock to the ice was enough to clear the intervening space; but the edge of ice was narrow and sharp, and below was a disagreeable-looking chasm, where the rock gradually shelved under the glacier at a depth that I did not care to measure. I own that I should have found it nervous work but for the security afforded by that constant friend of the Alpine traveller—the rope. One end was passed across to Zybach, the other being held by the older guide, standing on the rock behind us, and each

of us in turn, grasping this in the right hand, had no difficulty in alighting on the edge of the ice, and the guide who came last, holding the end of the rope, had the security that, even if his foot did miss the mark, we were all ready to draw him up again to where we stood.

Young Zybach showed both skill and courage on this occasion. Failing every direct means for reaching the surface of the glacier in safety, he had noticed a smooth piece of ice on which it was possible to alight by a jump from the rock; but this was cut off from the adjoining glacier by impracticable crevasses. His plan was to descend one of these crevasses' and make his way under the glacier, until he should find some other crevasse through which it might be possible to ascend again to the light of day. The ice does not touch the rock at every point, but, on the contrary, leaves hollow spaces through which it is often practicable for a man to crawl. A knowledge of this fact enabled Zybach to extricate us from a position where we should otherwise have passed a very uncomfortable night. It is clear that, in case of necessity, we might all of us, though with some damage to our clothes, have followed the course which he took for himself, and it is worth remembering by glacier travellers, that in a case of difficulty where they can find no road over the glacier, they may discover, at a pinch, a practicable way under it.

After this we had no further adventure; we had lost more than an hour, and the sun was fast declining, so we did not halt at the châlet of the Mettenberg, but passing the glacier round the corner of the rock just above the great ice-cascade of the Grindelwald Glacier, where we were assisted by planks laid across two or three crevasses for the convenience of the cattle descending from the

Mettenberg to their winter quarters at Grindelwald, we soon struck upon the path by which tourists who visit the so-called Mer de Glace usually ascend. I was struck with the appearance of the cascade, which exhibited an unusual degree of confusion. Owing to warmth and rain, the ice, which during summer is broken into turrets and pinnacles, looked as if these fantastic structures had been shattered by an earthquake; large masses had broken away here and there, and partially choked the crevasses. It must be remembered, however, that these fragments melt rapidly, the entire of their surface being exposed to the air; and I believe that a very small portion of them is ultimately re-embodied in the glacier at the point below the cascade where the crevasses are closed by the change of curvature in the bed of the glacier. As I have taken occasion to state elsewhere, it seems to me that the mechanical effect of an ice-fall is very much as if a series of long transverse wedges had been cut out of the mass of the glacier, while at the same time I admit that, notwithstanding the relief given by this process, there generally exists, at the foot of an ice-fall, an amount of pressure acting in the direction of the motion of the glacier sufficient to generate the veined structure which is almost invariably seen in such situations.

Our German companion now began to show undoubted signs of fatigue, so, leaving him and his friend with the guides, I hurried onward down the path towards Grindelwald. But my haste was of little avail. It was nearly pitch dark when I reached the bottom of the valley; I took a wrong turn among the numerous roughly-paved paths that surround the village. To avoid retracing my steps I struck across the fields, and in so doing encountered

a variety of petty obstacles, so that I reached the inn but a few moments before the rest of the party. We had been fifteen hours out, but under ordinary circumstances fourteen hours must be amply sufficient, allowing an hour's halt at the summit of the pass. In summer it would be advisable to start from the Grimsel not later than three o'clock in the morning, so as to leave time for any unexpected delay that may be encountered in the course of the day. The very gentle rise of the Aar Glacier from the Grimsel to the foot of the Strahleck makes this one of the least fatiguing of the high glacier passes. The precaution of wearing a veil during the latter part of the ascent saves the face and lips from the disagreeable effects which sometimes follow from exposure to the sun, the keen air, and the reverberation from the snow.

Grindelwald afforded me an amusing illustration of the extortionate habits of Swiss innkeepers. On paying my bill the next morning, I found a charge of half a franc for *eau sucrée*. On asking for explanation, I found that after breakfast I had put a lump of sugar, which I do not use at that meal, into a glass of water; and it was coolly maintained that as the water was not part of the breakfast, I should pay extra for the sugar so consumed.

I started after this for Berne and Geneva, leaving my travelling companions perfectly reconciled and convinced that there was yet much to learn respecting the glacier theory, and I bore with me the recollection of one of the brightest and most glorious days that I have ever enjoyed, snatched, so to say, from the very midst of the destructive inundations of September, 1852.

J. BALL.

NOTE.

Since the foregoing pages were written, I have been favoured by Mr. W. Mathews with the loan of a scarce tract, which contains the earliest published account of the passage of the Strahleck. It is a narrative, published in 1813, of the explorations and ascents made by four members of the family of Meyer, belonging to the town of Aarau. Two of them, the brothers Rudolph and Jerome Meyer, had two years before published an account of an ascent of the Jungfrau, effected in 1811, which had called forth in Switzerland various expressions of incredulity, especially on the part of those who knew the Jungfrau only from the Bernese side. In the summer of the following year a more numerous party, which included two sons, by name Rudolph and Theophilus, of the first-named Rudolph, together with a schoolmaster named Thilo, and several guides, undertook a more considerable expedition, which was designed as well to carry on scientific observations in the upper regions of the Alps, as to effect the ascent of some of the most considerable peaks, and especially to remove the doubts cast upon the reality of the previous ascent of the Jungfrau.

After a careful examination of this curious tract, I have come to the conclusion that the narrative, so far as it rests upon the authority of the Meyers, is truthful and accurate, and as the point is one of some interest, I may be permitted briefly to state my reasons.

The narrative, though written in the name of Rudolph Meyer the younger, is not the work of any member of the expedition. A preface informs the reader that it was composed by a Mr. Zschokke, who was the editor of a Swiss scientific periodical, upon the notes and verbal information given to him by Dr. Rudolph Meyer. The narrative has just the degree of incompleteness and occasional inconsistency that might be expected under such circumstances, but it contains a multitude of details sufficiently accurate to make it impossible to suspect that they could have been derived from guides or

chamois hunters, if indeed at that period there were any who had been bold enough to penetrate the region surrounding the Finsteraar Horn. But the strongest piece of evidence in favour of the truthfulness of the Meyers, which in my opinion has been rather wantonly called in question, is the map annexed to the tract now before me. It contains numerous correct details not to be found in the best of the then existing maps—that of Weiss. Indeed, I have seen no map until the recent publication of the Swiss Federal Map, approaching so near to correctness. The point upon which the greatest stress has been laid by sceptics, is the statement that in the second ascent of the Jungfrau, accomplished by Theophilus Meyer in 1812, the last ridge had been attained from the east side, instead of reaching it from the south, by the course which had been followed in the previous year by the elder Meyers, and which has been adopted in every subsequent ascent. It is true that it now appears impracticable to follow the track taken by Theophilus Meyer, but if appearances, without actual trial, are to decide in such cases, I fear that several of the authors of papers in this volume may hereafter have their veracity called in question on similar grounds. As it was, the difficulty of attaining the final *arête* is said to have been extreme, and three hours were consumed in mounting a height of 400 feet.

I shall speak elsewhere of the alleged ascent of the Finsteraar Horn, but I may here briefly notice the account of the passage of the Strahleck effected by Rudolph Meyer, on the 4th of September, 1812.

He says, that a tradition prevailed among the natives, that a certain Dr. Klaus had made the passage about 100 years before, and mentions a saying among the hunters at Grindelwald, that the chamois, when disturbed on that side, took secure refuge in the valley between the Finsteraar Horn and the Schreckhorn.

The account of the expedition which was undertaken from the Grimsel side, though meagre enough, is evidently derived from personal observation. Some glacier phenomena, and especially the formation of lateral moraines, are correctly

described, and in connection with a strangely mistaken idea as to the origin of medial moraines, there occurs a passage wherein the analogy between the movement of a glacier and that of a river is more clearly expressed than by any previous writer. I transcribe the sentence, which may interest some readers: —

"Indem der Gletscher jährlich durch die Schwerkraft "tiefer zum Thal rutscht, verlängert sich die Schuttlinie, "und tritt in die Mitte des Gletschers nach denselben Ge- "setzen, wie eine Schupfwuhr die stärkste Strömung eines "Flusses vom Ufer gegen die Mitte zu leitet."

Dr. Meyer must have passed the ridge of the Strahleck very much at the same point that is now chosen. He found a snow bridge over the *bergschrund*, and employed an hour in mounting the ridge. The descent was effected along the right side of the glacier by the same steep rocks where the guides now let travellers down with the rope, and they reached Grindelwald at eight o'clock P.M. From 1812, until M. Agassiz and his friends established their dwelling on the Aar Glacier, no traveller, save Hugi, seems to have visited the Strahleck. It is now frequently passed every season, and we may hope that many of the almost unknown passes described in this volume may, after a few years, be equally familiar to practised mountaineers.

CHAP. XI.

ASCENT OF THE FINSTERAAR HORN.

SOME few days before I left Cambridge, in July, 1857, purposing to make an eight weeks' tour in Switzerland with my friend, Mr. Ellis of Sidney College, a laugh was raised at my expense, by the suggestion of a facetious friend that I might distinguish myself by an ascent of the Finsteraar Horn. In point of fact, at that time neither I, nor any one present, knew that two happy mortals had succeeded in reaching its summit so far back as the year 1841, and the suggestion that I should attempt to scale it, was intended to have pretty much the same force as would now be conveyed in a recommendation to try the Matterhorn; though, perhaps, the time may come when even that mountain will not be considered inaccessible.

I was, therefore, intensely delighted when on meeting Mr. Kennedy by appointment at Interlachen, on the 4th of August, he informed me that he had met with two Cambridge men at Reichenbach, who were planning to take the Strahleck pass from Grindelwald to the Grimsel, and thence attempt the Finsteraar Horn, and that they had kindly authorised him to invite Ellis and myself to join the expedition.

Here was a glorious opportunity for giving a fitting response to the scoffs of my Cambridge friends. We at once eagerly accepted the invitation, and arriving at Grindelwald the next day, were introduced to Mr. St. John

Mathews, of Trinity, and Mr. William Mathews, of St. John's, our acquaintance with whom soon ripened into friendship, under the genial influence of common labours and common hardships. They had engaged the services of Auguste Simond and Jean Baptiste Croz, of Chamouni, and also of Johann Jaun of Meyringen, who had made two ascents of the Finsteraar Horn with Herr Solger of Basle, in 1841. Kennedy and his foot page, commonly, and not altogether without reason, known as Fortunatus, with Ellis and myself, completed the party.

We made a successful passage of the Strahleck, though, unhappily, we had rain and snow in all the higher portions of the pass, and could see little or nothing of the magnificent scenery by which we were surrounded. After two days' sojourn at the Grimsel, where the weather continued bad, we determined to change the point of attack from thence to the Æggisch-horn; and accordingly reached the Jungfrau Hotel on the evening of Saturday, August the 8th. Heavy clouds on Sunday morning, with rain in the afternoon, which at night-fall turned to snow, followed by thick wet mist all the next day, ought, I suppose, to have rendered us despondent; and probably would have had that result, but for the consoling assurances of our host, that the bad weather would not, nay, could not, last more than a fortnight. Happily, however, on Tuesday morning the clouds began to break. St. John Mathews, Jaun, and I sallied forth to explore a portion of the Middle Aletsch glacier, while the rest of the party walked to the top of the Æggisch-horn; but I believe the one question which occupied every one's thoughts, and pretty frequently found utterance, was, "Will to-morrow be fine enough for the Finsteraar Horn?"

There had been some strong negative opinions expressed in the early part of the day, before we separated; but the sky had brightened so steadily, that when the whole party met at dinner, and the question was put, the ayes were everywhere, and the noes nowhere. At length the last dish was removed, a fresh bottle of Beaujolais produced, and we proceeded to settle about guides for the morrow.

We had already with us, as I have mentioned, Johann Jaun, the only Oberlander who had ever reached the summit; and our two Chamouni men had shown themselves so extremely knowing in places where they had never been before, that we were inclined to trust these three as guides, and take only porters for the provisions and bedding. But old Jaun put in an objection: he knew no French, Simond and Croz no German; and so Jaun would have another man with whom he might consult in places of difficulty. I suppose the absurd system of rota in force at Chamouni accounts for the fact that so few of the first-class guides of that village, who are all such clever fellows, care to increase their efficiency by a study of foreign languages, as they feel that no additional acquirements would place them in advance of their comrades. They should bear in mind, however, that though this is true at home, it is not so in Switzerland; and that they would very materially increase their chance of making long engagements to travel in the Oberland or other mountain districts, by acquiring a knowledge of German and English.

We readily consented to Jaun's not unreasonable demand, but on applying to the landlord, we met with a fresh difficulty. He endeavoured to persuade us that we required, at least, two additional guides, and introduced to our notice Aloys Bortis of Viesch, a dark, sturdy-looking

fellow with a grave countenance and a limited vocabulary; one of his few words, however, was "camerado," and the burden of his discourse was that he would not go without his camerado, and that he and the camerado must each have fifty francs. In vain we argue, neither jokes nor simulated wrath can move him:—"Fifty francs for me, fifty francs for my camerado, or I go not." We appeal to the landlord, but to little purpose. Bortis, he thinks, is right. Ah! treacherous Wellig, good landlord, good cook as thou art, I cannot but abuse thee in this matter, for the camerado is thine own cousin, and out of that 100 francs the lion's share is thine. Bortis is no free agent, but thy slave, and while we are marvelling at the immovable greediness of that apparently stolid worthy, he is but repeating the lesson he has learnt from thee, "Fifty francs for me, fifty francs for my camerado, or I go not." *

We were too determined, however, on trying our luck on the morrow to hold out very long, and at last an abatement of ten francs being proposed, we closed without further dispute, and agreed to give ninety francs to Bortis and the camerado Franz Wellig, and twenty-five to a porter to go with us through the whole excursion, while wraps and provisions were to be sent on to the Faulberg, where we intended to bivouac, by two other porters at a very trifling expense. We gave a few directions as to the roasting of sundry meats for the morrow, and then, as the crowd of

* Wellig, whose hotel on the Æggisch-horn deserves the highest praise, and who is himself a very excellent fellow in most respects, acts both unwisely and unjustly in hiring men like Bortis and Bennen as his servants for the season, and then taking from them the fees which they receive for acting as guides to travellers, which he himself fixes at an unnecessarily high rate, but which they are made to demand as though they were really acting for themselves.

guides and servants, who had been interested watchers of our dispute, vanished from the salle, settled down again to our Beaujolais, and a cozy chat till bed-time.

We woke on August 12th to find the clouds all swept away, and as brilliant a morning as we could desire. In the highest spirits we ate a hearty breakfast, and then descended to the kitchen to arrange about provisions. Wine in abundance, one bottle of brandy, afterwards unwisely increased to two, roast mutton, roast veal, ham, sausage, cheese, bread, figs and raisins, were put together, one after the other, till the pile looked big enough to feed an army, and the corresponding arithmetic amounted to seventy-four francs. Later in the morning the guides expressed a desire for "noch ein wenig Brod und Fleisch," and the result of our consenting to this request was that the bill was increased to 114 francs, whence I presume that the word "wenig" does not exactly correspond to our English "little;" nor do I think it would have been a difficult matter to prove, from the character of the additions which were actually made to our store, that the phrase "Brod und Fleisch" includes things potable as well as things edible.

At 2.30 P. M. we started, twelve in number, including the five companions already named, Fortunatus, five guides, and one porter, forming together a tolerably imposing procession, although perhaps the dignity of the thing was rather affected by a certain levity of manner, and a boisterous tendency to laugh and shout. We were all in the highest spirits, and the two Chamouni men were greatly delighted at the idea of conquering one of the giants of the Oberland, and of returning to their native village covered with glory, the result of deeds achieved beyond the Rhone; while amongst the aborigines who

accompanied us, we had, marvellous to relate, a *volatile* Vallaisan, in the person of Alexander Guntern of Biel, a thoroughly jolly little fellow, as full of noise and rattle as a French waiter; and, in fact, at a later period of the expedition, when steadiness of head and hand were all important, he was a little more obstreperous than was agreeable, and we were obliged to call him to order.

Little time was occupied in reaching the summit of the grass slopes, which, rising at the back of the hotel, stretch in a northerly direction towards the picturesque pile of the Æggisch-horn, and whence we looked down upon the bright little Märjelen See, sparkling in the sun-light, and bearing on its bosom numberless islets of ice, broken off from the great cliff of the Aletsch glacier, which forms its western bank. It was at the south-west corner of this lake that we were to get from the rocks on to the ice, and away we all started, like so many school boys, racing against one another, leaping over masses of rock, and frequently alighting on ground of too juicy a character to be pleasant, (for the whole hill side was full of springs,) but all bent on accomplishing the descent in a rush. It proved, however, rather longer than we had anticipated, so difficult is it to judge of vertical distances, and water at the bottom of a valley always has the effect of diminishing the apparent depth. About 3.40 we were running along the margin of the lake, and I believe bathing was mentioned; but I had tested its chilling powers on a previous occasion, and was able to give such a forcible account of the pleasures of immersion at a temperature of 32°, that the suggestion dropped. On reaching the ice, which is very much crevassed at its point of juncture with the rocks, Kennedy, W. Mathews, and I left the rest of the party;

and while they, conducted by the guides, kept along the left bank of the glacier, where they met with wide and deep crevasses and a troublesome moraine, we took the centre of the glacier, and, after one or two slight difficulties at starting, found the ice in a most agreeable condition, with only such fissures as we could step or leap at pleasure.

As this magnificent glacier is nearly two miles broad, the two parties were soon shut out from one another's vision by the intervening hummocks of ice; and we, independent explorers, being ignorant of the exact position of the Faulberg, pushed on at a pretty rapid rate till we were opposite the extremity of the range of rocks which form the *grat* of the Walliser Viescherhörner, and in which we knew the Faulberg must lie. We now felt certain that we had advanced too far, and, after retracing our steps for some distance, we turned towards the left bank and shouted lustily, in the hopes of attracting the attention of the other party. For a long while our shouts were unanswered, but at length a distant cry was heard, and far away we espied our friend Guntern perched on a rock, and making the most frantic demonstrations. He had been sent in chase of us by our friends, who had taken up their quarters for the night as early as six o'clock. But, although it was past seven before we joined them, I am thoroughly convinced that we were quite right in selecting the middle, which is almost always the best part of the glacier; for had we possessed any means of recognising the Faulberg, and had we, when directly opposite to it, and not before, left the central route and made straight running to it, we should have anticipated the other party by more than an hour. In this case, if in no other, I am prepared

to maintain, against all Senior Wranglers, Senior Optimes, or Junior Optimes who may present themselves, that two sides of a triangle are shorter than the third.

About five miles from the Märjelen See, on the left bank of the glacier, is a break in the rocks apparently about sixty feet broad. Clambering up the débris and looking into the breach, you see that it extends laterally in either direction, and that you are standing at the mouth of a small amphitheatre; if you enter this, and climb up the rocks on the left, you will find, at the height of about 150 feet, two small clefts, and you will have reached the only shelter which nature offers you in these parts. The larger of the two caverns is tolerably roomy, and is capable of containing five or six persons,—*comfortably*, I was going to say, but there is one little drawback. Whether it is a favourite haunt of the fays of the mountain, and they have found it convenient to have a constant supply of water at hand, I cannot say, but certain it is that the water is turned on, and that there is no means of cutting it off, but down it comes, drip, drip, drip, splash, splash, splash, all day long, and, unfortunately, all night too. You may avoid it when you are awake, but when you are asleep,—ah, bah! — you never are asleep there,— but just as you are on the verge, down comes a big splash, and you are broad awake again; and so it will happen again and again, till at last, in despair, you drag out your rug into the open air, and roll yourself up again on the rocks outside. Such was the fate of the majority of our party on the night of August 12th; but St. John and W. Mathews and I had agreed to share the smaller hole, which is supposed to contain three; nor will I deny that, by some means or other, we were all inside at the same time, but

the crush was considerable, and I don't think either of us knew, with any degree of certainty, which was his own leg and which his friend's, or whether his shoulder was being damaged by a nubbly rock or by his neighbour's elbow.

Sleep, however, that comes to all, came to us, and, from nine to one, we dozed by turns and at intervals. At one o'clock, a well-executed crow from Guntern, who seemed in most respects a very fitting representative of the early village cock, warned us to rise, and, after a slight snack of bread and coffee, and much more time than necessary, though not perhaps more than usual, spent in packing the provisions, we started for the grand assault at 2.30 A.M.

The moon, now in her last quarter, had risen nearly two hours, but she was only just peering above the eastern ridge of our amphitheatre as we moved down the rocks, and a few steps of descent brought us again into black shadow. On we stumbled, though hardly at first possessing the free use of our limbs, creeping along the base of the Faulberg, now over rock, now over ice, and occasionally, when the latter was very steep, compelled to cut steps, till, by the time we were getting into open ground, the moon was high in heaven, lighting up the whole scene with intense brilliancy, and yet not dazzling down the brightness of the lesser fires, which, in that pure air, shone so sharp and clear, that they seemed almost within our grasp.

The position which we had now attained commands one of the most magnificent views in the whole range of the Alps. From it the spectator looks down upon a vast sea of ice, the confluence of three glacier streams, which,

uniting here, pour down their frozen waters along the mighty highway which we had trodden the day before. It is the Place de la Concorde of Nature; wherever you look there is a grand road and a lofty dome. Turn to the south-west, and from between the outermost spurs of the Ebnefluh and the Aletschhorn, comes tumbling a branch of the Lötsch glacier, with the spires of the Mittaghorn and the Grosshorn in the background. Turn half way round to the right, and you are met by the waves of the mightiest stream of all, the Greater Aletsch, fed by the everlasting snows of the Jungfrau and the Mönch, the cowled head of the latter hidden by the nearer cliffs of the Trugberg, but the spotless Virgin dazzling all eyes with her queenly beauty, as she lifts her face to meet the pure salute of her sister monarch in heaven. If you are not completely fascinated, let your heels lift you through another quadrant, and you are looking north-east, along another road of ice, which leads between the rocks of the Grünhorn and the northern outworks of the Walliser Viescherhörner to—shall we say to glory, or to the Finsteraar Horn? That great wall of rock, almost completely covered by snow, which we see in the background, is the Strahl-grat, and, though not the Finster, is yet of it; and in three hours more, if all be well, we shall be clambering up its western slopes. One minute before we step forward, one lingering look down the way we have come, the fourth of our cross roads, and far away, with nearly twenty square miles of ice between us, rises the jagged ridge of the Æggisch-grat, which separates us from the Rhone valley, from civilisation, and the busy throng of men.

And now the word is "vorwärts," and we have left the rocks, and are passing rapidly over the smooth névé; there

is scarcely a crevasse to be seen, but the light coating of frozen snow, which crunches pleasantly under our feet, renders our progress both easy and rapid, notwithstanding the sharpness of the ascent. We are walking nearly due east, with the moon on our right hand; gradually she grows paler and paler, and, as warned of the approach of day we hurry on to the top of the col, and thence look up at the snowy heights around us, there comes creeping over the topmost pinnacles that exquisite roseate tinge which all mountaineers know and love so well, but which pen and pencil must alike fail to delineate. Peak after peak is lighted up with the faintest pink, which rapidly deepens, through the most delicate gradations, into a warm flush of rosy red, till, just as their unearthly beauty seems to surpass all that we have seen before, suddenly, in a moment, their whole face is changed, there is not a tinge of crimson left, but they are all glistening bright like burnished gold, for the sun has risen upon them.

This glorious vision happened to us on the morning of August 13th, towards five o'clock; and as we now somewhat reluctantly prepared to move onwards, we saw the base of the Finsteraar Horn considerably below us, and perceived that we must descend diagonally along the face of a snow slope of about 30° or 35°, with our left shoulders towards the hill side. This, to my mind, is one of the most troublesome parts of snow-walking, and though in such cases the alpenstock stands one in good stead, yet the difficulty of getting a firm stroke with the foot, and the necessity of constantly swinging one leg over the other, renders a slip very probable. And so, at this point, the whole dozen of us were tied together with a strong though light rope that we had brought from England. Nor was this intimate

connection between us formed too soon, for scarcely had we taken half a dozen paces, when I completely lost my legs, and had it not been for the friendly cordon, which my neighbours on either side at once tightened, I should have gone rolling down for 200 or 300 feet; — not indeed that I should have come to any particular grief, for there was nothing but snow to roll on or to, but the time lost in the re-ascent of each unfortunate (and most of us took our turn in slipping) would have been very considerable. But with the rope, half a minute sufficed to bring each man on to his legs again, half a minute more to shake himself free of the extra snow, and the caravan was again in motion.

Although we had seen the highest peaks gilded by the sun, yet, being on the western side of the mountain, we remained in shade for some hours; but just as we neared the foot of the great peak, we caught a few warm rays through a rent in the Grat, which terminates in the Roth-horn, and, hailing the omen, at once decided it was time for our morning libations. Throwing off the rope, we hastened to fill our cups and horns with some of the Valais wine, and drained off our bumpers of that rather unpalatable and decidedly thin liquid, as though it were the choicest grape of Burgundy.

And truly, though I seem to sneer at it now, it is but seeming, for I am fully convinced it is the proper drink for the mountains, and that cold tea or milk on the one hand and brandy on the other, are equally a snare and a delusion. The former are not sufficiently invigorating, and though brandy should always be carried in case of illness, it should never be administered except as a medicine.

Some bread and mutton are now washed down by a second draught of wine, and we are off again. For the

next two hours we are climbing up a wall of rock which seems almost vertical: now hand over hand; now getting well into a corner, and bringing our backs into play after the fashion of chimney-sweeps; now coming to some awkward place, where the tallest man must go first, for his arms alone are long enough to feel the way, and choosing some safe ledge, must stretch down thence a helping hand to his shorter brethren, who occasionally, too, are thankful for a shove behind; now completely baffled by some monstrous crag, we are driven to take to the hard snow at the side, and ascend by sharp short zigzags, which without the confidence-inspiring rope are not altogether pleasant; then back again to the rocks, and holding on like grim death, or taking advantage of some small, *very small*, plateau for a moment's delay, while we wipe the streaming sweat from our faces; on again, with a cry to those below to look out, for the stones beneath our feet are giving way and crushing downwards; — till at last our advanced guard gives notice that we have reached the top of the rocks, and that a great slope of snow stretches upward before us as far as we can see. One by one we clamber on, glad enough at the prospect of a change of exercise, and though the slope looks somewhat severe, the rope is soon readjusted, and we are making long zigzags up the incline, with our alpenstocks ringing merrily in the snow, and the detached fragments skimming away from us with increasing velocity.

Though we were still sheltered from the sun, the glare of white began to tell on our eyes, and we were glad to assume our spectacles and veils, especially as we had little occasion to look to our steps, for, though at times Bortis'

hatchet was in requisition, the snow for the most part yielded pleasantly to the feet.

About half-past eight o'clock we took the opportunity offered us by a small clump of rocks, left bare in the midst of the vast expanse of snow, to make our final breakfast. "Now, *mes amis*, we must eat pretty heartily, for there'll be nothing more in that line till our work is over. Pass the mutton over here, Simond." "I fear, Monsieur, that there is no mutton here." "No mutton! Do you hear that, Mathews? there's no mutton here!" "Nonsense, Simond, we can't have finished it all." "That is true, Monsieur, but it has been left at the bottom of the rocks." "How absurd! Well, give me a slice of veal, then." "Monsieur, I am desolated, but there is no veal." "How! no mutton, no veal, what is there, then?" "Il y a du jambon, Monsieur." "Jambon! oh, yes, I know, tough as an old boot." "Il y a des saucisses, Monsieur." "Ah, that horrible *wurst*, it made me ill for a week the last time I ate it at Altdorf." "Il y a du fromage, Monsieur." "Ah, well, give me some gruyère then, though it's queer stuff for breakfast." "Monsieur, ce n'est pas gruyère, c'est le fromage du pays." "Fromage du pays! indeed, a mixture of bad butter, tallow, and salt. Upon my word, this is too bad; who packed the last knapsack?" "Messieurs les guides de l'Oberland." "Then Messieurs les guides de l'Oberland had better go down the rocks again, and fetch up something that we can eat." "Your plan would be admirable, my dear fellow, only that they would be four hours away, and we should get rather tired of waiting in that time.

So then, here we were, without the slightest prospect of returning to our stores till three or four in the afternoon,

and the man we had specially engaged to carry our food of no manner of use, inasmuch as he was carrying such as we could not touch. The guides had consulted their own taste alone in the selection of what they would carry into the higher regions, and there was nothing but bread for us, and not enough even of that to satisfy our voracious appetites.

I suppose I need hardly say that we growled. I should like to know the Englishman who would not under such circumstances. But growling could not conjure up mutton; and so washing down our crusts with some red wine and snow, we pursued our way, with our tempers *very* slightly soured.

Soon after this, the youthful Fortunatus confessed fatigue, but not before Franz Wellig, the camerado, who had been forced upon us, had exhibited very marked symptoms of distress. He happened at this time to be the leader of the file, and every five minutes he came to a dead stop, and looking back with as unconcerned an air as he could assume, inquired who had called to him, or why the rope had been checked? Half a dozen such stoppages and inquiries soon convinced us that he himself was the tired horse; and as he was really causing serious delay, we insisted upon his stopping altogether, or going on more steadily. He had already, in my opinion, had more cognac than was good for him, but being somewhat flustered by our objurgations, he now drew frequent and copious draughts from the dangerous flask. In spite of these, rather than by their assistance, he managed to keep on with us as far as the edge of the Strahl-grat, which we reached at 9.15, and where we made a short halt to look upon the new world that now burst upon us. For the last two hours our view

had been superb, and its range had gone on steadily increasing in every direction, save the east; but now that we had gained this knife-like ridge, right at our feet, but some 5000 feet beneath us, we saw with delight the magnificent basin of the Finsteraar glacier, encircled by precipitous cliffs, so steep in many parts that no snow would rest upon their face, and with but one enormous gap through which the frozen torrent swept away to join the Lower Aar.

If the reader refers to the plate in the frontispiece, he will notice a rather large patch of snow in the centre of the picture, from which the rocks rise both to the right and left so as to form a rough V; this is the spot where we were now lying, and from this point to the summit our whole route is traceable; for although we mounted the western side, of which, unfortunately, we possess no reliable sketch, the final *arête* is so narrow that, for this part of the ascent, it is a matter of no importance from which side the drawing is taken.

I have heard an *arête* described as an infinitely narrow ridge of rock, with an everlasting vertical precipice on one side, and one longer and steeper on the other. This is not strictly true of any *arête* with which I am acquainted, but in the case of the Finsteraar Horn, the nearly vertical precipices towards the east, which are delineated in the plate, are above 5000 feet in height; while on the west a snow-slope stretches away to a still greater distance, at an angle of 65° or 70°, and the ridge itself is only just sufficiently broad to allow the assailants to advance in single file. Had there been any wind, we must at this point have given up all hopes of success, but the sky was cloudless, and there was not a breath stirring. We had taken off the rope, and when I suggested to Simond, on starting, that it would be

well to readjust it, I was met with the rather startling answer that it would be worse than useless here, for that the weight of any unfortunate who slipped would certainly drag the others down. "Non, Monsieur," said he, "ici, chacun pour lui-même." Not that he by any means acted on this principle, for he was always ready to give a hand to any one who wanted it.

Fortunatus had now had enough, and determined on awaiting our return to this patch of snow, but Wellig, considering himself rather insulted by our taunts, started off in a huff to be the first at the top. Barely, however, had he gone a hundred yards, when he dropped as if he had been shot. Ellis, who came next, thought he was only resting, and walked quietly over him; but when I came up I saw it was something more than a rest. His eyes were turned up, and his mouth drawn down, and he presented altogether a singularly fishy appearance. What to do I knew not, but Croz, who was close behind, at once adopted an original method of treatment, which, though apparently harsh, was eminently successful. Seizing him by the two lapels of his coat, he brought him into a sitting posture, and then shook him backwards and forwards so heartily that a very few oscillations brought him out of his swoon, and, being now completely done up, he retired to join Fortunatus.

Onward we went along the *arête*, generally quite independently, but sometimes giving a helping hand to one another, and in very awkward places condescending to take hold of a strap held by one of the guides. When the rocks were bare of snow, we could see what we were about, but when there was snow, we had to try it first with our alpenstocks, as it often lay over the edge in the form of a

cornice, and several times I had the gratification of seeing my pole pass right through, and as I drew it back and beheld the glacier right beneath me, I knew that had I unwarily put my foot there instead of my stock, I should have gone down "like lightning, and finally been dashed to pieces, thousands of feet below, in the horrible depths of the glacier." But as every one knew that caution was necessary, and nobody had any desire to imitate lightning, we continued our course at a considerable altitude above those depths; and I would say, once for all, that to the healthy man with steady head, strong hand and firm foot, and with tried companions of the same calibre as himself, there is no such thing as danger in these excursions, except from want of caution. The inclination of our route was very variable, as a glance at the plate will show; in parts so steep that the step-like character of the rocks alone enabled us to proceed, whilst in others it was not more than a very gentle ascent. At one point (it is discernible in the plate, at the sudden fall where the snow lies near the summit,) the ridge was so narrow and so awkward, that we were obliged to crawl for some few yards on our hands and feet, till, coming to more pleasant places, we were again able to walk or rather to clamber uprightly. Through the whole distance the hand bore quite as important a part as the foot; and though I wore no gloves, and my hands were of course frequently in contact with ice and snow, the sun was so powerful and the exercise so severe, that I felt not the slightest inconvenience from the cold.

At 11.53 we had gained the summit, a small semicircular plateau, on which the ten of us who had persevered in the ascent could scarcely stand at the same time; and in the centre of the semicircle was the cairn of stones

which Solger and Jaun, the only human beings who had preceded us, had erected in 1841.*

I was soon at the top of this, spite of the rebukes of Bortis, and, hat in hand, led a very efficient volley of cheers. A very small modicum of brandy tempered with snow was then administered to each (wine would have been better, but it would not have been possible to carry a sufficient quantity through the final climb), and we sat down to enjoy the magnificent scene around us.

The valleys of Switzerland are so narrow, and the walls of rock that hem them in so steep, that at great heights they are usually concealed from the spectator. Not a speck of green was now visible, nothing but the great white and black expanse of snow and mountain.

Our panorama on this occasion must have had a radius of seventy or eighty miles, and would have extended farther, but though the sky was still cloudless overhead, a low bank of cumulus cloud was creeping up all round the horizon. However, 17,000 square miles can hardly be considered a contracted view, and we found it quite sufficient for our contemplation during the short half hour we remained. Close around, but below us, rose the grim Schreckhorn, the obelisk-shaped Eiger, the round-headed Mönch, the graceful Jungfrau, and the massive Aletsch-

* It is true that in a book published at Aarau in 1813, it is stated that three guides reached the summit in 1812; but I think no one acquainted with the character of the Oberlanders will be inclined to believe that they carried out such an undertaking by themselves, while certainly a regard for truth would not prevent their asserting their success, though they might never have attempted the final *aréte*. When Mr. Kennedy made his first attempt to ascend Monte Rosa, which proved unsuccessful, his guides advised him to say that he had been to the top; and though he of course rejected their counsel, they went down into Zermatt and spread this falsehood through the village.

horn, a group nowhere perhaps to be equalled in beauty of shape and variety of outline; while, at a greater distance, we saw the Süstenhorn, the Bortelhorn and Monte Leone; and, right beneath the mid-day sun, the glittering peaks of the Fletschhorn and Mischabel range, with perhaps the top of Monte Rosa looking over them. One of our party, I think it was the veteran Kennedy, saw Mont Blanc; but this was a happiness denied to his less experienced companions. Half an hour soon slipped away, and after depositing a piece of paper with our names thereon in the empty brandy-bottle, which we fixed securely in the cairn, we prepared to descend, but not before we had detached sundry fragments of rock to carry away with us. It is currently reported that each man says he has got *the* top. I am sorry to disappoint the other four aspirants, but I can assure them that I have it myself.

Whatever may be the difficulties of ascending an *arête*, coming down is, I think, much worse. The very fact of the downward motion increases the chance of a slip, and the strong wrench by which you haul yourself up an awkward place, is more easily learnt than the steady, slowly-relaxing grasp by which you drop yourself down. In short, if, to use an Irishism, in ascending mountains the descent came first, I think fewer exploits of this sort would be accomplished; but, being once up, there is no choice left, you must come down. Bortis seemed to be so thoroughly of this opinion, that he started off at a rattling pace entirely on his own account; but on being stigmatised as *ganz Teufel* by Jaun, he returned, and though he continued unattached, condescended to give us the benefit of his occasional assistance. As for the rest of us, we divided into three parties of three each, and roping together with

rather longer spaces than usual, commenced the descent in the following manner. I will take as an example the trio in which Croz, Kennedy, and I were the performers. Croz and Kennedy remained stationary while I descended, till I came to a spot where I could not only stand steadily, but bear a strain on the rope if necessary; then, while Croz and I waited, Kennedy joined me, and thus set me at liberty to make a fresh start, till, when I stopped a second time, Croz joined Kennedy, who then descended to me. Thus there was never but one person moving at the same moment, and though this plan necessarily occupies a considerable time, it is the safest method of descending such an *arête* as this.

We reached the Grat in about two hours, and as Kennedy and I were bent on a comfortable supper and bed at the Æggisch-horn, we took Croz with us, and, bidding farewell to the rest of the party, readjusted our rope, and dashed rapidly down the snow slope. We soon overtook Fortunatus and the camerado, and rather foolishly yielded to the entreaties of the former to take him on with us; I say foolishly, because he had no chance of getting beyond the Faulberg that night, and it would have been far better if he had waited to be picked up by the second detachment. As it was, however, we took the two on to our rope, and, after a rapid glissade or two, came to the top of the rocks. Here we held a council of war as to our mode of proceeding. Kennedy was for one long glissade, but Croz recommending the rocks, we adopted this as the more prudent course, though I believe we might have taken the snow with perfect safety, and, in that case, we should have reached in ten minutes a much lower point than that which we attained after a troublesome struggle of nearly two hours.

A short rest at the foot of the rocks, and we were soon treading in our old track of the morning past the base of the Grünhorn. But in what a different state did we find the snow. Then it only just crunched beneath our feet, while now we sank knee-deep at every step; then not a crevasse was perceptible, but now, though by an inexperienced eye they were still hardly to be recognised, the long sunken lines stretching across the fields gave warning of the deep abysses, which were only just covered over to the depth of eighteen or twenty inches by a mass of soft snow. In some cases even that had disappeared, and the fissured névé itself was visible. Croz had succeeded in crossing one of these crevasses, and had planted his stock, and taken up a firm position on the other side, after the approved fashion, but when I, whose place on the rope was second, took the leap, the snow on which I alighted gave way beneath me, and down — I should have gone but for the rope. A vigorous pull from Croz, and an energetic use of my own arms and legs, soon brought me up again; indeed, I never sank below my chest. But I had converted the crevasse into such a tremendous gap, that there was no chance of the rest following in that place, and so we had to go for some distance along its edge, with two of us on one side, and three on the other, till it was sufficiently narrow for an easy jump, and we were all once more pushing forward together.

At 6.15 we discarded the rope, and soon after, bidding good-night to the camerado and Fortunatus (who had already caused us serious delay, and who were now within easy distance of the Faulberg), we rattled on to the main Aletsch glacier, and, taking a central course, were soon skimming rapidly over its surface, though occasionally

getting a shoe-full of water as we splashed into the small pools, which are generally scattered over large glaciers, and whose surface ice, after a long summer day, is always very thin. When we had pushed about half way down the glacier, the sun sank beneath the horizon, and almost at the same moment Kennedy announced to us that he was losing his sight. The long day's glare had been too much for his eyes, and he could scarcely see the ice at his feet.

Here was an agreeable position. Three men in the middle of a glacier, which neither of them had traversed but once before, one of them blind, evening setting rapidly in, and, by way of making things pleasanter, dark clouds rising, a drizzly rain beginning to fall, and low thunder growling in the distance. However, we could not stay there, and so on we went, with poor Kennedy as helpless as a child, led sometimes by Croz, sometimes by me, and fancying every little hole was an enormous crevasse. Once he proposed a bivouack, or rather that we should choose a good piece of ice, and promenade thereon till daylight should appear; but the suggestion was received with coldness not to say with scorn, and after a good deal of floundering, especially towards the end, where we got a little too near the left bank, and became involved in some rather awkward crevasses, we reached the rocks at the head of the Märjelen See at 10.30, and were not sorry to be again treading on terra firma.

Our difficulties were not, however, quite at an end, as we found a good deal of trouble in picking our way in the dark among the masses of rock, which border the lake, and cover the hill side; and, in our anxiety to avoid them, we did not pay quite as much attention as we should have

done to our route, and after an hour and a half's ascent, found that we had taken a direction too much to the east, and were descending into a valley separated by a narrow ridge from that in which lay our much desired haven.

Happily as soon as we left the ice, Kennedy's eyesight began to amend, and by this time he could see quite distinctly, for it was he who discovered the error, and but for his warning we should have gone much further wrong. Convinced, however, by his arguments, we soon mounted this intervening ridge of 400 or 500 feet, and after a little while, falling into the regular track, set steadily onward for the hotel.

It was at this time that I experienced the only sensation which seemed to argue considerable fatigue, and though I allude to an optical illusion of which I was the victim, I believe it originated rather in fatigue of the mind than of the eye. The moon had risen, and where her rays were reflected from what must have been wet rocks or pools in the distance, I seemed to see a magnificent hotel with well ordered terraces and gardens, and I particularly noticed the moonbeams playing on the roof, which was apparently of slate. A remarkable point about the illusion was that the building was perfectly symmetrical, and could not, therefore, have been owing to the shape of any of the rocks.

At length, at one o'clock on the morning of August 14th, we reached the real hotel of the Æggisch-horn, though this seemed to me, as we approached, to be four or five times larger than I knew it to be.

Our vigorous hammering at the door was responded to by a sleepy inquiry as to the place whence we came, to which we merely vouchsafed the answer, "Finsteraar

Horn." It proved a very efficient "open sesamé." We were at once received with rapture by the elder Wellig, who would fain have embraced us, I believe, but not reading in our faces any encouragement for that extreme proceeding, contented himself with a vigorous *shak-hands*, and with the performance of an extempore triumphal dance. Called to a sense of his duties by a demand for supper, he disappeared for an instant to return laden with all sorts of delicacies, exhibiting such a celerity of motion, and so just an appreciation of what we should most desire, as did him infinite credit.

The rest of the party joined us in the morning at breakfast time. They had reached the Faulberg about eight, and slept more soundly than on the previous night. After a very jovial breakfast we settled accounts, of which, for the benefit of future visitors, I offer a copy.

Bill for provisions	114	francs.
Bortis and Camerado	90	„
Guntern	25	„
Three guides for three days at eight francs a day*	72	„
	6) 301	
	50·16	

Thus 50 francs 16 centimes was each person's share of the expense. I do not think this is a very large sum for so much pleasure, and had we been unencumbered by the camerado, and remained firm as to the quantity of provisions, in which case the supply would have been really

* Simond, Croz, and Jaun received eight francs a day as their regular rate of wages, and although they were really only occupied forty-four hours, we thought it right to consider the expedition as one of three days, as it spread over a portion of Wednesday, Thursday, and Friday.

ample, eighty francs would have been saved, and each individual's expense reduced to 36 francs, 83 centimes.

J. F. HARDY.

NOTE BY THE EDITOR.

I have elsewhere spoken of the book published in 1813 giving an account of the excursions made in the previous year by the Meyers of Aarau. Amongst these is the alleged ascent of the Finsteraar Horn by three guides who are said to have accompanied Rudolph Meyer, junior, to the top of the Oberaar Horn. There can be no doubt that one, if not both, of these statements are incorrect, though for my own part I do not question the truthfulness of Rudolph Meyer, whose report of the ascent was published at second hand by the Aarau editor. I am inclined to believe that the point reached by Rudolph Meyer was that north-west of the Oberaar Horn named by Agassiz the Altmann, and that the guides may probably have attained the ice-capped peak of the Studerhorn between the last and the Finsteraar Horn. It is true that Meyer asserts that a few days later he saw from the Finsteraar glacier the pole which his guides told him they had planted on the summit; but every one knows how much the imagination helps the eye that is straining to perceive some minute object; and speaking with due hesitation in a matter where certainty is not possible, I believe that the first mortals who ever attained this formidable peak were Herr Solger and his guide in 1841.

CHAP. XII.

EXCURSION FROM THE ÆGGISCH-HORN TO THE MÖNCH SATTEL, OR COL DE LA JUNGFRAU.

THE excursion described in the following pages has no pretension to rank with the daring exploits of those who have scaled the loftier summits of the Alps. Its only claim to a place in the present volume is that it is *new*, or, at least, so far as I am aware, unpublished. It is not described in Murray's Handbook, nor have I met with any one who had made the same expedition before me. Yet it is certain that there are few excursions to be made in the High Alps, by which the ordinary traveller, who does not feel equal to undertake any of the great ascents, can see more of the "glacier world," and penetrate more thoroughly into its secret recesses than by that which I am about to describe.

The enormous glacier of Aletsch, though the largest in the whole range of the Alps, was comparatively little known until a very recent period. It is only within the last six or seven years that the wonderful view of that glacier and its surrounding peaks, from the summit of the Æggisch-horn, has come to be known as one of the *lions* of Switzerland; and still more lately that the establishment of the excellent Hôtel de la Jungfrau, on the eastern slope of the same mountain, has afforded travellers facilities for exploring the great glacier in question, second only to those furnished

by the well-known hotel on the Riffelberg. Even now the Aletsch Glacier is little visited by tourists in comparison with the Mer de Glace, or the Gorner Glacier; though there is no great glacier in the Alps, except perhaps that of the Lower Aar, that can be traversed with so much ease through so great a portion of its extent. Most of those travellers who have explored its recesses have done so with the view of ascending some of the mighty peaks that surround it, and have made use of it as the high road to the foot of the Jungfrau or the Finsteraar-horn. Without feeling myself equal to undertake any such arduous enterprise, I was desirous, if possible, to see something more of this vast field of ice than could be done by a mere ordinary ramble on the glacier; and it was with this view that in September, 1858, I consulted the intelligent master of the hotel as to the best means of effecting my object.

I knew, indeed, that there was a pass, which I had understood to present but little difficulty, up the Aletsch Glacier, and thence by a side arm of it down into the Lötsch Thal; and I should probably have decided on making this expedition, but that it did not suit very well with my plans for the remainder of my tour. It was for this reason that when the landlord suggested to me that it was possible without any serious difficulty to ascend the glacier itself to its very head, where the névé from which it proceeds rests against the ridge that separates the Jungfrau from the Mönch, and thence to climb the ridge itself, that I caught eagerly at the idea, and made immediate arrangements for putting it in execution.

I started the next morning, Sept. 16, 1858, at half-past four o'clock, by a brilliant star-light, while the rosy glow in the sky over the snowy peaks that separate the upper

valley of the Rhone from the head of the Val Formazza, already gave promise of a beautiful morning. We reached the Märjelen See in about an hour and a half. This beautiful little blue lake, bounded immediately by the ice wall of the glacier, is undoubtedly one of the most striking and interesting objects to be seen in the whole range of the Alps. Very shortly before my arrival at the Æggisch-horn it had burst its barriers, and a large part of its waters had found their way through some unknown outlet — not a subterranean, but a *subglacial* passage, for it must be a channel passing under the whole extent of the lower part of the glacier, a distance of several miles—but fortunately for the picturesque effect, a part only of the lake had thus disappeared. It was in fact reduced to about half its ordinary size, the part nearest the glacier still presenting the usual phenomenon of a number of small icebergs — fragments detached from the neighbouring cliff of ice—floating in its clear blue waters, while many others, of various sizes, were stranded on that part of the bed of the lake that now remained uncovered, and which we were able to cross dry-shod, in order to reach the opposite bank. From thence we gained the glacier itself without the least difficulty, and proceeded at a rapid pace, as nearly as I could judge up the very middle of the great stream of ice. For some distance the peaks of the great southern chain from the Fletsch-horn to the Weiss-horn, which are seen to such great advantage from the summit of the Æggisch-horn itself, were full in view, brilliantly lighted up by the early morning sun. As we advanced, however, they were gradually shut out from view by the nearer mountains, the offshoots of the group of which the Aletsch-horn is the crowning point, and our attention was wholly concentrated

upon the lofty peaks around us, and the long valley of ice that we were ascending. Fortunately for us, the state of the ice and snow was everything that could be desired. The upper part of the glacier was indeed still covered with a coating of lately fallen snow, which had added greatly to the fatigue of an excursion I had made less than a week before to the summit of the Cima di Jazi; but a cold wind in the morning had hardened this sufficiently to prevent its yielding to any inconvenient extent. The crevasses on the glacier itself are neither numerous nor difficult, and though I had no guide but one I had brought with me from Chamouni, who had no previous acquaintance with the glacier, we found no obstacles of any kind to impede our progress.

As we approached that portion of the glacier where a broad arm of it branches off to the left to the elevated col between the Aletsch-horn and the Jungfrau, from which another stream of ice flows down in the opposite direction, towards the valley of Lötsch, there gradually opened to our view a long range of peaks which we had not before seen, forming part of the ridge that extends from the Jungfrau towards the south-west, and separates the glaciers and valley of Lötsch from the upper valleys of Lauterbrünnen and Gasteren. I could readily recognise by the assistance of the map, the successive summits of this range, the Gletscherhorn, Mittaghorn, Grosshorn, and Breithorn—names well known to the tourist in the Oberland; but when seen from this side, they presented no longer the familiar forms, so conspicuous from the Wengern Alp, or Mürren, and it was difficult to believe that the summits before us were really the same that are seen from the Bernese side of the chain. The very slightly inclined slope of the Aletsch Glacier gives so completely to the traveller the impression

of an ordinary valley, and the mountain walls around him so entirely shut out everything beyond the immediate boundaries of that valley, that one forgets the absolute elevation at which one finds oneself, and cannot repress a feeling of some disappointment that the near mountains do not look higher. I remember experiencing something of the same feeling many years ago, when I first visited the glacier of the Unteraar; but on that side the Finsteraar-horn and the Schreck-horn rise from the glacier beneath with an aspect decidedly grander and bolder than that which the Aletsch-horn and the Jungfrau present from the Aletsch Glacier. The actual elevation of the point on the Aletsch Glacier, from which the lateral valley branches off to the Lötsch Thal, is, according to the government survey, not less than 9148 feet above the sea; hence the Aletsch-horn itself, the most lofty of the peaks that surround it, is only 4620 feet higher. Its *relative* elevation is, therefore, not much greater than that of Ben Nevis above the waters of Loch Eil. I may add, that of the mountains which surround the Aletsch Glacier, the Aletsch-horn is incomparably the most striking. Few travellers are aware that this peak, so little known, in comparison with its brethren of the same group that are conspicuous from the Oberland, is actually 132 feet higher than the Jungfrau, that celebrated mountain being only the *third* in elevation of the group to which it belongs. The Finsteraar-horn itself, the highest of all, is shut out from view during the whole ascent of the glacier, by the long ridge of which the Viescher Hörner form the highest summits.

After halting a short time at this point of the glacier, almost directly opposite the spot at the foot of the Faulberg, where a kind of cave affords a sleeping-place for those who attempt the ascent either of the Jungfrau or the Fins-

teraar-horn, we proceeded onwards up the main arm of the glacier, in a direct line towards the col which lay full before us. My guide thought it prudent in this part of our progress to tie ourselves together with a rope, a precaution which was perhaps hardly necessary, but contributed to expedite our movements, as we were able to advance with less care and circumspection; and though this part of the glacier is somewhat more crevassed than lower down, there was nothing whatever to present any difficulty to any but the most inexperienced *iceman*. Gradually the glacier passed into the more uniform and smooth character of the névé; the ascent, though still very gradual, became somewhat steeper, but the snow remained tolerably firm, and we were able to make good way. On our left rose the rocky pyramidal ridge of the Jungfrau: on our right the beautiful snow-covered mountain known as the Trugberg—a name given it by Agassiz and his companions to commemorate the error of some of their guides who mistook this peak for the Jungfrau—but the name is not admitted on the government map. Its ascent would appear, as viewed from this point, to be no very difficult task, and my guide even suggested that we should undertake it in preference to the ridge before us. I preferred, however, adhering to my original plan; and we proceeded steadily and quietly to the foot of the ridge itself. The actual ascent of this is very steep, while the snow drifting over from the broad *plateau* beyond forms a kind of projecting ledge, as frequently happens where one slope of a mountain is much more precipitous than the other. There was only one point where the top of the ridge seemed quite free from this obstacle, and thither, accordingly, we directed our course, ascending obliquely the steep slope of snow. The inclination of this was so great that we should have had

some difficulty in keeping our footing had not the snow been in remarkably good condition. If it were at all hard it would be absolutely necessary to cut steps in it, and we were unprovided with an axe. In any case, however, the ascent presents not the slightest danger; for there is no *bergschrund* yawning at its base to receive the traveller in case of a slip, and the worst that could happen to him would be to have a rapid *glissade* on to the snow beneath, and to have to recommence the ascent. As it was, we accomplished the climb without any difficulty, and emerged on to the broad surface of snow beyond, when in an instant a wide sweep of the Bernese Oberland, which had been hitherto entirely concealed by the ridge on which we now stood, opened upon our view. There lay all the familiar mountains and valleys, the Wengern Alp, the Faulhorn, and the valley of Lauterbrünnen actually under one's feet—the village of Unterseen immediately in front of us —with all the successive ridges beyond the lakes of Thun and Brienz, over all which one looked upon the wide hazy expanse of plain beyond, and the distant ridge of the Jura encircling the horizon. I could not make out distinctly the site of Berne, the plain being, as usual in such cases, partially obscured with haze, but the well-known group of buildings formed by the castle and church of Thun were conspicuous. Unfortunately the lake of Thun was concealed. Judging from the map, I had expected that this would have formed the most striking feature in the view; but the long ridge which extends from the Suleck westward towards the Schwalmern, and which from this point of view is remarkably regular, exactly hides it. I afterwards observed from the lake itself, that the ridge on which we now stood was not visible from thence, though the

Jungfrau and the Mönch on each side of it form such conspicuous objects.

The ridge at this point is covered with a broad expanse of snow, not forming a level *plateau*, but sloping at first gently towards the north; and then curving over, so as to become rapidly steeper. The idea naturally presented itself to my mind whether it might not be possible for an adventurous mountaineer to descend on the other side, so as to find a passage by this route from the Æggisch-horn to the Wengern Alp; but having subsequently examined it with much care with a telescope from the Lauber-horn above the Wengern Alp, both my guide and myself were fully satisfied that such a scheme was wholly impracticable. The vast mass of snow which hangs on the northern declivity of the col on which we were now standing, breaks off abruptly at its lower edge, where it rests immediately on one of those immense precipices of limestone which form the northern face of the chain; and after the most careful examination, it appeared to us impossible that any way should be found either to the right or the left of it. The precise point at which we had emerged is readily recognised from the Bernese side, being immediately to the left (as seen from that side) of the beautiful pyramidal snow-covered peak which forms the last step of the ridge of the Jungfrau. It is, I believe, this peak of which the height is given in the government survey at 3560 mètres, or 11,680 feet; while the next point of the ridge to the left is 3550 mètres. The actual elevation of the col I had no means of estimating accurately; but it is not much lower than the point last mentioned, probably about 11,500 feet.

As I had so recently ascended the Cima di Jazi, un-

doubtedly one of the most interesting of those excursions in the Alps which are accessible to the ordinary tourist, I was naturally led to compare the two. As a whole, the view from the Col de la Jungfrau cannot be compared with that from the Cima di Jazi; the range of snowy peaks and lofty summits visible from the latter point is almost unrivalled, while the magnificent precipices of Monte Rosa, as seen from thence, are far grander and more imposing than those of the Jungfrau. From the point on which we now stood, that beautiful mountain is, indeed, not seen to much advantage; it is from the north only that it assumes its well-known grandeur of effect. From the actual ridge the Mönch is much better seen, and assumes a more prominent appearance. But it is the sudden and striking contrast presented by the view over the Bernese Oberland, after one has been so long shut in by the great mountain walls that bound the icy valley of the Aletsch, which is the characteristic feature of the view from the col of the Jungfrau, and which entitles this comparatively easy excursion to rank among the most remarkable that can be made in the Alps.

In returning we followed precisely the same route as in the ascent. After descending the steep slope of snow by a rapid *glissade*, we halted to make our midday meal, just at the foot of the only bare patch of rock which occurs for a considerable distance along the ridge. This is formed of a loose disintegrating rock, fragments of which are continually rolling down, though, from the softness of the snow beneath, they do not travel far. Nor are they apparently large and numerous enough to form anything like a *moraine*. In this respect, indeed, the glacier of the Aletsch stands almost alone among the glaciers of the same

order of magnitude, that it has no *medial moraine*, a circumstance which perhaps adds to the grandeur of its effect, as the whole breadth of the valley of ice, from the foot of one mountain barrier to the other, is seen at a glance. Throughout the whole extent that we traversed in this day's excursion, the small number of blocks or large masses of stone, was indeed remarkable; and, except at its lower end, near the Märjelen lake, the whole surface was almost free from stones.

After quitting the glacier we halted again for a short time on the banks of that beautiful little lake; and while I was observing with interest the remarkable cliff of ice presented by the glacier on this side, my attention was suddenly roused by a loud crash, and a large mass of ice detached itself from the upper part of this cliff, and fell into the still waters below. But I noticed that, as is so commonly the case with avalanches elsewhere, it did not descend in a solid mass, but broke into a thousand pieces in its fall, apparently from its own weight and the rottenness of its mass. Hence it would appear that the floating icebergs which remain in the lake must either have been detached from the glacier at a time when the ice is in a more compact state, or are only the remaining portions of very much larger masses than any that are now visible. After again crossing the dry bed of the lake, and beginning the ascent of the mountain ridge on the other side, we flushed a large covey of ptarmigan, which rose within a very short distance of us. These were the only ones that I saw in the course of my tour this summer. I do not know whether it be accidental or not, but I have come across them much more rarely of late years than in former excursions among the Alps.

The climb from the lake over the intervening ridge, in order to reach the hotel, though it appears nothing when one comes to it fresh in the morning, is enough to make a considerable addition to the fatigue of the day's excursion, and is, indeed, the principal drawback to the situation of the hotel itself as a centre for glacier expeditions. We reached the hotel just about six o'clock, having been a little more than thirteen hours and a half on the whole excursion, including halts for rest and refreshment. The master of the hotel had at first told me that it would take sixteen hours, which he afterwards moderated to fourteen; but of course in this case, as in all similar ones, everything depends upon the state of the ice and snow. Had the névé, and the snow on the upper part of the glacier, been as soft when we were ascending as it was on our return, I should scarcely have accomplished the excursion within the day.

The whole distance, as measured by a pedometer, which I carried in my pocket, was 27½ miles; of which the ascent from the lake to the summit of the ridge was just about ten miles. It may be worth while to mention that having walked with a pedometer throughout my whole tour, I came to place much more confidence in its indications than I had been disposed to do at first. Of course its measurements can only be regarded as a rough approximation, but still it is, I believe, much closer than can be obtained by any other means at the command of an ordinary traveller.

E. H. BUNBURY.

NOTE BY THE EDITOR.

In illustration of Mr. Bunbury's remark that in such excursions everything depends on the state of the snow, I may briefly refer to my own experience on the same glacier.

I started from the Æggisch-horn Hotel soon after 3 A.M. on the 20th of August, 1857, the day following that on which Mr. Mathews effected the ascent of the Graffeneire. I intended to explore the upper end of the Aletsch Glacier, without positively deciding whether I should aim at the Mönch Sattel, or at some other point in the same neighbourhood. I had indeed a secret intention, if the snow were very favourable, to attempt the ascent of the Mönch. But I encountered the deep fresh snow, which opposed so formidable an obstacle to Mr. Mathews, little more than an hour above the Märjelen See. Although the central part of the glacier is quite free from difficulty, the prolonged walk through soft snow was extremely fatiguing. The ascent of the Mönch was clearly out of the question; and it was with something like satisfaction that I saw clouds begin to form over the col, and thus supply a good excuse for discontinuing the monotonous labour of plodding onward through soft deep snow, that glared before the eyes with almost intolerable radiance, and so found myself free to undertake some other more interesting work. I was just opposite to the ridge of rocks that descends to the southward from the Trugberg. A considerable glacier, rather steep and crevassed, which is not indicated on any map excepting that of Dufour—the Swiss Federal map—descends between the Trugberg and the Grünhorn. Turning at right angles to the course I had hitherto followed, I was guided to the easiest point for passing from the lower end of this glacier to the rocks of the Trugberg by the trail of a chamois. The rocks consist of sharp edges of micaceous flags dipping at a very high angle, that project at intervals, something like the fins on a fish's back, from the base nearly to the summit of the Trugberg. In the interstices, and especially towards the part overhanging the lateral glacier, which may perhaps be called the

Trugberg Glacier, there is a considerable supply of soil arising from the disintegration of the adjoining rocks, whereon may be found a large number of flowering plants. Of these, in a very short time, I gathered over twenty species, including a stunted specimen of *Thymus serpyllum*, with bright red flower, and, at a still higher station, that ubiquitous fern, *Cistopteris fragilis*. Of all the order this is the species that seems to support the greatest extremes of temperature. The only mountains in Europe where it is positively rare are, I believe, those of Ireland, where the uniform climate appears to be unfavourable to its growth.

The sun's rays were falling nearly perpendicularly on the steep slopes, and the occasion was favourable for observing the conditions under which vegetation proceeds in the higher region of the Alps. A thermometer immersed for ten or fifteen minutes in the soil at a depth of five inches stood at 74·6° Fahr. When the superficial layer was reduced to one inch, the thermometer rose to 83°. When removed a few feet to the shady side of a projecting rock, and covered to the depth of two inches, the temperature rapidly fell to 42° and the air in the shade was at 45°. Now the interval between five inches and one inch includes the space within which the roots of most Alpine plants penetrate the soil. Only two or three of those that I gathered extended much below that depth. These observations tended very much to confirm an opinion that I have long held, that the flowering plants of high mountains receive a much greater degree of heat during their short period of active vegetation than is commonly supposed.

The chief limit to the extension of species upwards is, I believe, their power of resisting the severe frost of night, after the relatively great heat of the day; but during the interval between the middle or end of June when they are left uncovered, and the close of September when they are again buried in their winter shroud of snow, the absolute amount of heating rays received on the surface of the plants themselves, or on the soil that surrounds their roots, is probably greater than reaches individuals growing some thousands of feet lower down. I am inclined to think that the number

of species capable of adapting themselves to these conditions is much larger than could be inferred from the small number of plants actually found together in any single station. It must be remembered that the prevailing physical conditions are altogether unfavourable to the diffusion of species upwards into the region where the surface of the earth is habitually covered by snow or ice, or else consists of rocks too bare to sustain vegetation. Fixing the lower limit of that region in the European Alps at about 9,000 feet, very few species in the zone immediately below—say from 7,000 to 9,000 feet—ripen their seeds; and even where ripe seeds are carried upwards by violent winds, by birds, or by other accidental causes, the chances are something like a million to one against their being deposited in a spot above 10,000 feet in height, where it is possible for them to germinate. There may perhaps be more reason to believe that the plants which we find at great heights on small oäses in the ice region, are the remains of a more abundant vegetation, which has dwindled to its present trifling proportions owing to the extension of the glaciers, than to suppose that it has been derived under present climatal conditions from the lower zone, where vegetation is continuously spread over the surface. My present object is merely to point out that, in comparing together the small patches of vegetation found here and there at great heights in the Alps, they are found to include a considerable number of different species, although very few of these are seen in any single station. I can call to mind but four species that are almost invariably present: *Ranunculus glacialis*, *Saxifraga oppositifolia*, *Cerastium alpinum*, and *C. latifolium*. The last two—if indeed they are distinct species—descend to the Alpine zone, and have no exclusive preference for the higher region, but the former are the almost unfailing characteristics of the glacial flora, and do not willingly inhabit spots where their roots are not moistened by melting snow at the season of flowering.

Considering their height, which is from 10,200 to 10,500 feet above the sea level, these rocks of the Trugberg support the largest number of species that I have yet seen in such a situation; and I regretted afterwards that I had not searched

more diligently the entire of the lower patches of rock, to see what further names I could add to my list. The ground was, however, so steep, that it took time to move about, and I was anxious to ascend somewhat higher.

I had probably reached the point in the ridge which is marked on Dufour's map 3,513 mètres (equal to 11,526 English feet), the lowest of the three successive steps that lead to the summit, when, on consulting my watch, and calculating the distance to be retraced before reaching the Æggisch-horn, I decided on returning to the foot of the rocks, where I had left my guide asleep in the sun. On the way home we proved the use of the rope, as two or three times one or the other slipped through the softened snow into concealed crevasses. I kept rather to the Aletsch-horn side of the glacier, for the purpose of gaining a nearer view of the adjoining rocks; and in crossing from thence towards the north-west angle of the Märjelen See, I came upon a *moulin* far exceeding in proportions any that I had ever before seen. During a momentary halt, the distant roar of the fall nearly a mile distant caught my ear; guided by the sound, I approached, and found, not as usual a small stream, but a powerful torrent approaching the dimensions of a river, that rushed headlong with a deafening crash, like that of the Handeck, into a wide circular chasm in the ice. The eye could not penetrate far, but, if visited early in the morning, there is no reason why this *moulin* may not be sounded, as the mass of falling water is probably sufficient to keep the shaft nearly perpendicular. The occurrence of a hot day soon after a heavy fall of snow had doubtless increased the supply of superficial water very much beyond the average; but it is probable, from the vast extent and almost unbroken surface of the middle region of the glacier, that its *moulins* are at all times more considerable than those seen elsewhere in the Alps.

About this part of the glacier I noticed the extraordinary length to which a system of narrow crevasses, nearly absolutely straight, and inclining upwards at an acute angle with the right bank, extended across the glacier. Several that I was able to follow with the eye from an eminence on the surface, were certainly more than a mile in length. These crevasses

were probably of the class due to the differential velocity of the centre as compared to the sides of the glacier. Their great length, in this instance, must be due to that transference of the most rapid portion of the ice current to the convex side of the glacier, whenever its bed is laterally bent, which Mr. Tyndall has noticed on the Mer de Glace.

The permeability of the ice-cold water to radiant heat was conspicuously seen in the pools which had formed on the surface of the glacier during the day. Stones lying at the bottom of these pools had, by the heat which they received through the water, been enabled to penetrate the ice underneath to a depth of several inches, and I found them in the evening fast frozen under the water into the little nests which they had hollowed out for themselves.

The sun had set when we prepared to leave the glacier. Repeatedly as I had been impressed with the grandeur and the vastness of this unequalled ice-stream, the effect was never so great as on this evening, after I had spent a laborious day in traversing a part of its surface. By their scenery, as well as their physical characteristics, glaciers suggest to the least scientific minds analogies with rivers, and particular glaciers with particular rivers. The Mer de Glace, and the Aar Glacier, by their picturesqueness, their comparatively long celebrity, and semi-historical associations, recall the great rivers to which they respectively contribute, the Rhone and the Rhine. The Gorner Glacier, from its great breadth and ill-defined banks, is rather a lake fed by many mountain streams than an ice-river; but the Aletsch, in the breadth and stillness of its steady flow, in the undisturbed solitude of the region through which it pours unseen its mighty current, amidst heights of which but one has ever felt the foot of man, may rather be likened to some of the great streams of the New World, rarely named, and still more rarely visited, where Nature is displayed on a scale of vastness with which, in this quarter of the globe, we are unfamiliar. Other glaciers send forth torrents from the ice-caverns at their foot; this alone pours out a river. The Rhone carries down to Naters the drainage of its own glacier, to which are added the con-

tributions of a dozen other ice-fed streams; yet the single outlet of the Aletsch Glacier that rushes under the bridge between Möril and Naters far exceeds, in the volume of its flood, the entire mass of the Rhone at that point. I question, indeed, whether the united torrents of any four glaciers in the Alps could equal that single stream.

It is high time that so great a glacier should receive a share of the attention that has been bestowed upon his minor brethren. The daily and annual rate of advance at different stations, the rate of subsidence and of ablation, or removal of the surface by melting and evaporation in different parts of the glacier, and the inquiry whether this proceeds to an appreciable extent in ice that is covered with snow, either fresh or remaining from the winter, are among the points which require to be determined. Especially interesting it would be to sound the depth of a *moulin*, if such can be found to penetrate the entire thickness of the glacier. It would be well to provide not less than 1500 feet of line for this purpose. A hut erected at the north-west angle of the Märjelen See would greatly facilitate glacier observations, as well as excursions towards the still untrodden peaks that surround the Aletsch Glacier.

CHAP. XIII.

THE WILDSTRUBEL AND OLDENHORN.

HUNDREDS of tourists every summer travel through the Simmenthal on their way from Thun to the Lake of Geneva, and hundreds more traverse the valley of the Rhone between the Lake of Geneva and Leukerbad or Visp; but between these two main roads there lies a chain of mountains comprising every variety of beauty, and intersected by passes of the greatest interest, which, for want of information on the subject, may be said, so far as travellers are concerned, to "waste their sweetness on the desert air."

Running nearly south from the road between Thun and Chateau d'Oex are two valleys, the Ober Simmenthal and the Saanenthal, branching off at Zweisimmen and Saanen respectively. A short distance above Lenk, or An der Lenk, as it is sometimes called, the first of these is divided into two by the green slopes of the Laubhorn; that to the east leading to the foot of the Räzli glacier and the Wildstrubel, and that to the west—the Iffigenthal—forming the line of the Rawyl pass to Sion. The Saanenthal also divides at Gstaad into two branches, the eastern one leading to Lauenen at the foot of the Wildhorn, and the other passing by the village of Gsteig to the Sanetsch pass, which crosses the main chain into the Valais. The mountains at the head of these valleys will form the subject of the present chapter.

BERNESE ALPS
from the
OLDENHORN TO THE WILDSTRUBEL
Mr Hinchliff's Route
Saane R.
Lauenen
Lenk
Lohn
Engstligen
Amertenh
Wildstrubel
Gemmi
Gsteig
Arnen See
Ormont
Col de Pillon
Arbelhn
Gelten Gl.
Wildhn
Schneid
Weissenhorn
Gl. de la Plaine Morte
Wildstrubel Gl.
Lämmernhn
Inden
LEUK
SIERRE
River Rhone
Lens
Ayent
St Leonard
Chandolin
Derborence
Avencon R.
Argentine
Villard
Arveye
Chamossaire
Tour de Ostin
Gl. de Sanfleuron
Diablerets
Rothhorn
Iffigenh
Rawil
Rohrbach
Gletscher
Lauenen See
Wildstrubel Gl.
Leukerbad
SION
Engraved by Edwd Weller

The simplicity of manners which still prevails in the Ober Simmenthal, and the exquisite variety of mountain, wood, and valley which characterises it, realise that charming ideal of Switzerland which poets have pictured, but which the sojourners at Thun and Interlaken have long imagined to be extinct. Clean and comfortable quarters are to be found at An der Lenk in the Gasthof Zum Sternen, kept by Christian Matthie, one of the most honest and straightforward of men.

Here I had spent a couple of days in 1855, after crossing the Rawyl pass, which I have attempted to describe in a former work; and I returned to the same spot on the 5th of September, 1857, having appointed it as a rendezvous with that experienced mountaineer, Mr. Bradshaw Smith, and intending, amongst other excursions, to attempt the ascent of the Wildstrubel. I was accompanied by my old guide, the trustworthy Zacharie Cachat of Chamonix, but the morning after our arrival proved so rainy that we could do no more than take a quiet walk to the Sieben Brunnen in the afternoon. These so-called seven springs have lost their title to that name, having been of late years divided into a larger number of streams. They are situated at the extreme end of the valley, close under the rocks which support, at a great height above them, the Räzli glacier, and are reached in a charming walk of about an hour and a half from Lenk. I had visited them before, but it was only on this latter occasion that I was able to appreciate their peculiar character, by climbing above the rocks where they are first seen tumbling over in a row of small cascades. It now appeared that they issue from the heart of the mountain itself, instead of traversing its surface; and as the water is evidently glacier water, it must

have come through some subterraneous channel from the vast heights of the glacier above.

The next day, though the weather was still threatening, as my friend had not yet arrived, Cachat and I went off alone to explore a way to the Wildstrubel. We again ascended the valley, and between the village of Oberried and the Sieben Brunnen we turned to the left, skirting the base of the Amertenhorn, which was close on our right, but afforded no possibility of ascending its precipitous sides. After walking nearly due east for an hour, we thought we could find a way up to the right, over the shoulder of the Amertenhorn, which stands out like an advanced guard of the Wildstrubel, from which it is separated by part of the Amerten glacier.*

We could observe overhead a series of long precipices of rock, one above the other, like a giant staircase, and, as these are dangerous and impassable, it is important, while using them as a landmark, to leave them to the eastward in ascending. Crossing the stream, we at once began to mount, and after a steep and rough scramble of about an hour, chiefly over rocks sprinkled with loose shale and stones, we at last turned the shoulder of the Amertenhorn, which is covered with loose slabs, here and there mixed with sufficient earth to support a few straggling ranunculuses. Full in front was, as we expected, the glorious mass of the Wildstrubel, only separated from us by the Amerten glacier.

Angry clouds were gathering round, which soon peppered us with a shower of large hailstones, so, before venturing upon the glacier, we took the precaution of piling up one or two heaps of stones to guide us on our

* Leuthold's map gives an entirely wrong position to the Amertenhorn.

return, as we were ignorant of the localities. The whole mass of the Wildstrubel runs nearly north-east and south-west, and is divided into two separate portions, of which that to the east is the largest. The side of it on which we were consists of excessively steep rock, streaked with snow, and wholly inaccessible; while the western portion, which terminates in a sharp point, consists of hard snow and ice, and is so steep that it could be ascended only by cutting steps for the whole distance. Between the two, however, there is a ravine of snow and ice, running upwards almost to the summit of the mountain, and by this we resolved to attempt the ascent, though we knew that, as we had started very late, there would not be time to complete it on that day. We crossed a nearly level part of the glacier, and in about half an hour had ascended a considerable distance up the snow slopes, not having met with any crevasses presenting much difficulty. Here we saw that the remainder of the ascent would be very steep, and partly over a slope of smooth ice, with a long crevasse at the foot of it. We had neither rope nor axe, so we made up our minds that we had done enough for a reconnaissance or pioneering expedition; we felt that a way was found by which in less than two hours we might reach the summit from the point where we stood, and with this satisfaction we returned to Lenk, halting for luncheon on the highest rocks.

Two days later, on the 8th of September, having been joined by our anxiously expected comrade, we started from Lenk about six o'clock in the morning, with a perfectly clear sky and every prospect of success. We had a good rope of our own, and borrowed a rather short-handled but very strong axe from old Matthie; armed with which, and

with plenty of determination, we told him he might look for us in the course of the day on the top of the Wildstrubel. Following our former track, we again arrived in three hours at the edge of the Amerten glacier, and breakfasted by the side of a pool of clear water. We then crossed the glacier in our old footmarks, and in half an hour more reached the furthest point of our former expedition.

The remainder of the ascent was, as I have said, very steep, and though we knew from a distant observation that there were many formidable crevasses in the way, we could not tell their position when at the bottom of the slope. There would have been much loss of time in finding our way among these, if I had not provided against the difficulty by a precaution which seems worthy of notice and recommendation.

The upper part of the Wildstrubel is about eight miles in a straight line from Lenk, and the details of its surface are of course very indistinct to the naked eye at that distance, but I spent half an hour on the previous morning in carefully making a plan of them as seen through an excellent telescope which I always had with me. Some of the large crevasses stretched nearly the whole way across our intended route, but I was enabled to lay down a pretty accurate chart of their position, marking the points at which they might be crossed, and then laying down the line to be followed amongst their intricacies. When soft snow has to be traversed, the time lost in searching for a passage is of no great consequence; but when, as I knew was the case in this instance, great part of the way lies over steep hard ice, where steps must be cut with great

labour, the loss of time caused by détours is a serious matter.

Directed by my telescopic chart of our course we bore away to the right, so as to turn the flank, as it were, of a huge crevasse, above which we again moved to the left, Cachat in the front cutting very deep steps, and sending the ice flying about in showers. The slope here was so steep that, when the fore-part of the foot rested in the holes cut by the axe, our knees touched the ice above; and, as the vast crevasse showed its blue yawning depths immediately beneath us, great caution was necessary. This slow progress on the ice is cold work, and we were not sorry when after a long half-hour of it we found matters mending a little. The worst was passed, and the incline soon became less steep, and more covered with snow. We crossed one very long and deep crevasse by the bridge, which was correctly laid down on my chart; and, following the line there indicated, we safely reached the western summit of the mountain in one hour and forty-five minutes from the bottom of the slope, the latter half of the way having been upon good firm snow.

This peak terminates in a sharp point of snow, where we rested about a quarter of an hour, in the full enjoyment of an enchanting view. Seeing, however, that the eastern summit was rather higher, we soon retraced our steps down to the saddle which divides the two portions of the mountain, and in less than twenty minutes reached the highest part of the eastern division, which consists of a long undulating crest of snow, perfectly easy to walk upon, about 10,716 English feet above the sea.

From the Wildstrubel, the view to the south includes

every mountain from Mont Blanc in the west, which, even at this distance, appears truly magnificent, to Monte Rosa, the Mischabel, and the Fletschhorn in the east. We saw part of the valley of the Rhone beneath us, clad in a deep purple haze, and turned with peculiar interest to the Val d'Erin and the Val d'Anniviers, terminating respectively in the glaciers of Ferpêcle and Zinal, over the whole length of which we could trace our former routes by the Col d'Erin and the Trift pass. Right away from our feet stretched vast slopes of spotless snow to the south and east, forming themselves lower down into the Lämmeren glacier, the foot of which reaches nearly to the Daubensee, by the side of the Gemmi pass. The thought at once occurred to me that, if the Wildstrubel could be ascended from the side of the Gemmi, it would be a splendid expedition to cross over its summit from thence into the Simmenthal, and I made a mental note of it in my list of *agenda* for a future season.

Turning to the north-east we found that the peak of the Jungfrau was hidden by the beautiful intervening crest of the Altels, but the Eiger showed its sharp pinnacle a little to the north. A little more north, and what a change from this bristling array of giants! The green Engstligen Thal, guarded at its extremity by the pyramidal Niesen, led our delighted eyes to the distant lake of Thun; and the still more smiling Simmenthal showed us in its centre a collection of white specks which we knew to be the quiet village whence we had started in the morning, and in which old Matthie would soon be expecting our return.

After basking in the sunshine for nearly an hour, and drinking to the health of absent friends, we went back to the saddle or neck of snow between the two summits, and

looked down the slope by which we had ascended. Seen from above it appeared so frightfully steep, that, remembering the nature of the ice, and knowing how much more difficult it is to descend than to ascend over such ground, we all resolved, after a short consultation, to return, if possible, by some other way. Once more we remounted the western summit, and made up our minds to descend to the Räzli glacier. A great part of this side of the mountain consists of long steep slopes covered with loose débris of a very rough description, varied however with beds of snow, down which we had some famous glissades. The Räzli glacier was soon reached, from which, before touching the part where it is very much crevassed, we turned sharp round to the right over a rocky shoulder, and found ourselves in the desert space between the Wildstrubel and the Amertenhorn. This was what we had hoped for: we were soon again on the Amerten glacier, and in exactly an hour and a half from the summit reached the spot where we had breakfasted in the morning, and where we now proceeded to devour the contents of Cachat's knapsack, which had been left among the rocks. Thence we returned to Lenk by the now familiar route, and soon after six o'clock were welcomed by the loud and hearty congratulations of our delighted host. Great excitement was caused at Lenk by our expedition, and on the following morning we had a regular levée of the inhabitants, all wanting to look through my telescope at the route which we had taken, and giving vent to very amusing expressions of surprise.

Before saying farewell to the Wildstrubel, I must mention that in the season of 1858 I had the great pleasure of fulfilling the wish formed in the previous year,

and of crossing from the Gemmi to the Simmenthal over the summit of the mountain. Accompanied by Mr. Stephen, I went to the Schwarenbach Inn, which is well known as the lonely half-way house between Kandersteg and the Baths of Leuk. The special object of our search was Anderegg Melchior, a guide unsurpassed in activity, courage, and good humour; none better can be found among the Alps. We were fortunate enough to find him at home, and he showed the most genuine pleasure at meeting again. There is to me a peculiar charm about this Schwarenbach: throughout the day, even if there is nothing else to do, the occasional groups of travellers afford some society and plenty of amusement, including as they do specimens from all the nations under heaven; but, as sunset arrives, all are gone laughing and chattering, on foot or on horseback, down away to Kandersteg or Leukerbad, and the inhabitant of the quiet little Schwarenbach is left in profound stillness to contemplate the sublimity of nature. While darkness is already beginning to gather round the house, the lofty Rinderhorn in front is glowing in the last red light of the sun, and the spotless side of the snowy Altels, touched by the Great Magician's wand, is suddenly robed in exquisite carmine—a gorgeous pyramid whose point seems soaring into the highest heaven. "Then comes the check, the change, the fall;" the cold, pale shroud of night closes round the lustrous form, and, one by one, the stars peep forth to gaze upon the dying beauty.

Such was the evening of our arrival: we had the house all to ourselves, and, on returning to it, after watching the sunset, we found the host ready to make all comfortable for the night; over our coffee Melchior was invited

to a council of war, in which we sketched the plan of about a fortnight's mountaineering. The campaign was opened by an ascent of the Altels next morning, the 11th of September, for though I had formerly reached the same summit, it was in weather the very reverse of that which we now enjoyed. My only reason for mentioning it on this occasion is the following. I took the exact bearings of the summit of Monte Rosa as compared with the Mischabel and Weisshorn, the latter of which is generally supposed to conceal it from the pass of the Gemmi. Our expedition to the Altels being very easily concluded about noon, we strolled away to the Gemmi for the purpose of spending an hour or two in contemplating the beautiful view. There was not even the smallest vestige of a cloud, and we were enabled to clear up a long-established doubt by distinctly seeing the Nord End and Höchste Spitze of Monte Rosa between the Weisshorn and Mischabel. There was no doubt about it; though looking low down and much smaller than those two mountains, in consequence of greater distance, the outline agreed exactly with what I had seen a few hours ago from the summit of the Altels, and by the aid of a telescope we could distinctly make out the rocks of the Höchste Spitze, with which we both had reason to be intimately acquainted. Much interested by this discovery, I communicated it to a stupid guide, named Wandfluh, who chanced to be passing with some travellers. No doubt he had always been in the habit of telling people that Monte Rosa is hidden by the Weisshorn, so he now refused to be *désillusioné*, and actually maintained that a small rocky tooth in the Mischabel range was the Petit Mont Cervin! It was useless to reason with an obstinate

man, so we allowed him to depart, unconvinced by taunts or telescopes.

We next turned our thoughts to the Wildstrubel. Melchior said that he knew the Lämmeren glacier thoroughly, and that we should have no difficulty in reaching the summit by that route. His idea, however, of getting to the Simmenthal was by traversing the lower part of the Wildstrubel glacier and the Glacier de la Plaine Morte as far as the Rawyl route, and the Iffigenthal. On my telling him that I had made the ascent directly from the Amerten glacier, he was highly pleased at the opportunity of learning a new route. We slept again at the Schwarenbach Inn, and at five in the morning, after a very comfortable breakfast, we started with our faithful Melchior and a poor domestic of the inn, whom we took as much out of charity to him as to ourselves, to carry our knapsacks as far as the top of the mountain.

Turning our faces southwards, for about five minutes we followed the mule-road to Leukerbad, whence we then diverged slightly to the right, slowly ascending and keeping near the line of the old Gemmi road, whose former course may in many places be traced by the regularity of the slabs of stone which formed it. We soon found ourselves on the western side of the gloomy Daubensee, but at a considerable height above it. Turning away gradually to the right, we came in sight of the Lämmeren glacier, by which we were to ascend. We kept on the high ground to the right or north side of the glacier, the foot of which was considerably below us; resolving to take to the ice at a much higher level. Accordingly, we followed a sheep-path along the sloping side of the mountain, till we found ourselves, in two hours after leaving the house, at a point

where it was perfectly easy to get upon the glacier, some of its roughest parts being already fairly beneath and behind us.

We were a little below where some fine pinnacles of ice marked one of the much-crevassed portions caused by a sudden increase in the slope of the bed of the glacier. We might have ascended still further by the rocks, so as not to touch the ice till above this rough part, but Melchior preferred travelling on the glacier, and we entirely agreed with him. For a while we had very few crevasses in our way, but when we came to the rise, we should have had great difficulty in advancing had we not found a most convenient ridge, like a huge continuous backbone, which led us in the right direction, through a perfect maze of troubles, without much loss of time. Once only, near the end of this part, Melchior had an opportunity of showing his powers on the ice. We suddenly found ourselves cut off from the front by a large crevasse, the further side of which was much higher than the nearer; it was only bridged by a thin connecting wall of ice, the top of which was sharp as a knife; but, rather than turn back, the gallant Melchior very coolly prepared to cross this remarkably awkward bridge. With his axe, which was rather like a pick with only one arm, he chipped off the top of the ice, so as to make it two or three inches wide, and he continued this process, as he advanced sideways, in crab-like fashion. I could hardly believe he meant to cross, but presently he held out his hand to me, saying, "Ich bin fest;" I grasped his hand, and followed; but as there was a blue hole of unknown depth on each side, and as the edge we stood on was only wide enough to support the middle of the foot, I could not help thinking of what

would happen if either of us lost his balance. Melchior's confidence, however, seemed complete, and inspired me with a belief, afterwards confirmed, that he could do anything on the ice.

Meanwhile the others had outflanked the difficulty by more prudently making a short détour to the right; a few paces further re-united us on a fine open plateau, apparently free from any difficult crevasses. The head of the Wildstrubel rose in great beauty from the further side of this plateau, and we moved straight towards it over such hard and firm-crusted snow that our feet hardly ever sank more than an inch during the next hour. The ascent for a long distance was very gradual, and leaving on our right a magnificent rocky peak, which Melchior asserted to be the Lämmerenhorn*, we came to a halt on the snow at the foot of the final slope, not much more than an hour after first entering upon the glacier.

It was now about time for the mountain breakfast, and while we were discussing that delightful meal, the movements of a noble chamois interested us greatly. We saw him like a mere speck at first running along a high ridge of snow on the Lämmerenhorn, till he was stopped by the edge of the precipices, over which we could see with the telescope that he was carefully examining the whole glacier below, as if on the look-out for a comrade. After standing motionless for some minutes, he advanced to a point nearer us, and continued his observations. Our presence was apparently unsatisfactory to him, for presently he left the snow and disappeared among the rocks, Melchior remarking that he was evidently an old hand at reconnoitring.

* Melchior said the map was wrong in placing the Lämmerenhorn at the south side of the glacier.

In about twenty minutes we moved on again, turning rather to the left, as the incline appeared less steep in that direction; the snow, however, was from this part very soft, intersected by a few large crevasses, so that we progressed much more slowly than before; still there was no difficulty to encounter, and, turning again to the right, after a singularly easy ascent, we reached the highest point of the Wildstrubel in four hours and twenty minutes after leaving the Schwarenbach.

The greatest satisfaction of this expedition was the certainty which we had thus discovered of being able to pass directly from the Gemmi to the Simmenthal. As we took the last step up the snow, all that lovely valley, with its green and sheltering mountains, burst in an instant upon our view; the former expedition made me secure of every step down the mountain, and with the telescope I could make out the windows of the comfortable little inn at Lenk. We descended to the valley by the Räzli and Amerten glaciers instead of the precipitous slope over which I had ascended with Cachat in the previous year, and, taking plenty of time to enjoy the exquisite scenery, we arrived in Lenk about half-past four in the afternoon. The only particular incident in the course of the descent was that, among the rough stony district between the Wildstrubel and Amertenhorn, we saw three chamois, at about two hundred yards' distance; the place is so utterly unfrequented, that they seemed much less shy than usual, and even came towards us for a nearer inspection of their visitors. Stephen and I remained nearly hidden by a rock, whilst Melchior, with all the caution of an accomplished hunter, keeping a rock between them and himself, stalked up to them so close that, suddenly lifting

his head, he threw a handful of stones at them, when scarcely more than ten yards from him; a pistol-shot might have killed any one of them.

I have since heard from Mr. Forster, that the shepherds have contrived a path among the precipices, immediately above the Sieben Brunnen, up to a small pasture near a little lake called the Fluh See, by the side of the Räzli glacier; so that, in all probability, the Wildstrubel might be approached in that direction also, though at first sight it would appear a work of great difficulty.

Apologising for so long a digression, I return to my companions of 1857, Mr. Bradshaw Smith and Cachat. On the morning after our ascent of the Wildstrubel in that year, the 9th of September, we departed by the pass over the Trüttlisberg for Lauenen, accompanied by its agreeable and intelligent pastor, who had come over to spend a day at Lenk and was returning to his own village. This route is not particularly interesting in itself, but our object in going to Lauenen was to attempt the ascent of the Wildhorn, which lies between the Rawyl and Sanetsch passes. In this I have reason to believe we were mistaken; the Wildhorn would probably be more easily approached by the Rawyl pass and the glacier, which extends from the very summit of the mountain to the neighbourhood of the pass.

At Lauenen we found rough but not uncomfortable quarters in a rustic inn, and at five o'clock next morning were ready for a start. The weather was decidedly bad, and likely to be worse rather than better. I happened to be rather unwell, and finding the clouds settling down into a steady rain, I made up my mind to return about two hours after starting, and left Bradshaw Smith with Cachat to

continue the expedition, which I knew must end in failure. About six in the evening they returned wet through, and reported great difficulties, which were much increased by bad weather and falling snow. They thought that they had been within less than an hour of the summit, but could get no further. The weather remaining very unsettled, next day we determined to abandon the Wildhorn for the present, and push on to Villard in the Canton Vaud, where my friend's family were staying in a mountain *pension.*

A pleasant walk of rather more than two hours brought us to Gsteig, at the foot of the Sanetsch pass, whence, in nearly three hours more, we reached the head of the valley of Ormont-dessus at Les Iles, having crossed the verdant and delightful Col de Pillon. Iles is a scattered little village, on both banks of a lively stream abounding in trout, situated among rich pastures of an emerald-green, and surrounded with well-wooded grassy hills. The beauty of the view towards the head of the valley cannot be surpassed. The northern side of the Diablerets and Oldenhorn group forms a grand crescent of precipitous rocks of immense height, streaked with lofty cascades and surmounted by snowy peaks and small overhanging glaciers. Towards their base, the mountains on the right and left slope down to the valley, covered with dense masses of noble pines, and the châlets scattered about the rich pastures of the foreground combine to form the most perfect scene that an artist could dream of.

After waiting nearly an hour at a very small inn, and getting some execrable wine with our luncheon, we walked across the meadows in a south-west direction towards the pass of La Croix, the highest part of which is only about 2000

feet above the valley. The line of ascent is almost entirely through pine forests, till near the top, when a fine open kind of down is reached, only dotted here and there with trees; but after a quarter of an hour's descent we again found ourselves on a forest path, which continued almost all the way to Villard, where we arrived late in the evening.

Here I stayed with my kind friends for nearly a week, making various excursions in the neighbourhood; and, anxious though I am to take my reader to the Oldenhorn, I really must say a few words about the Châlet de Villard, in the hope of inducing some quiet-loving traveller to pay a visit to this charming resting-place. It is halfway between the villages of Grion and Chesière, and about four hours' walk up hill from Bex. Rich green meadows come up to the very walls of the house, beyond which shady pine-woods in every direction offer a delicious retreat after a course of hard work among the great mountains. Close behind, on the north, is the Pointe de Chamossaire, the summit of which can be reached by the most leisurely walker in less than two hours, without once leaving the soft turf. Passing through Grion to the south, one may soon reach the magnificent ravine leading to the Grand Moevran, and somewhat further rises the scarcely less beautiful Dent de Morcles. Full in front, to the west, is the triple-crested Dent du Midi, and the space between this and the Dent de Morcles is filled up by the distant group of Mont Blanc and his attendant aiguilles, shining far above the deep blue haze of the Rhone valley; every peak, from the Aiguille du Tour to the Monarch himself, being distinctly recognisable at the distance of from twenty-five to thirty miles. The house itself is comfortable, though not pretty; but, placed as it is in what appears a noble park of un-

dulating ground, there is little left to be desired. The whole cost of living, and living well too, is only four and a half francs a day, and in the neighbouring village of Grion it is even less than this.

The Châlet de Villard is kept by M. Roud, an old colonel in the Swiss army, who has made a large fortune by his vineyards of Yvorne, in the valley below. In the winter he lives at Ollen, and for the summer season opens his pension at Villard. His daughter, who by the bye is an heiress, usually presides in the country house, the colonel himself only appearing at intervals, when he some times brings a friend up with him. One day he was accompanied by his great crony, the master of the Croix Blanche, at Aigle, and in a conversation with him, w gained a great deal of information about the vineyards and the system of grape-treatment for invalids. Some of these unfortunates are condemned to eat six pounds of delicious grapes a day, for the purpose of purifying the blood. From the same authority I found out the method of obtaining the veritable Vin du Glacier. The casks of wine are taken up, before the winter, to safe hiding-places among the rocks in the neighbourhood of a glacier: here they are left till the following spring; and during the severe frosts all the inferior parts of the wine freeze to the sides of the casks, the purest part remaining unfrozen in the middle. With the help of an axe the ice is broken, and the choicest wine obtained; but it is hardly necessary to observe that the greater portion of the Vin du Glacier which is supplied at the hotels, has not gone through this expensive and delicate treatment. By way of a treat, M. Roud opened some choice Yvorne of the 1834 vintage, and for the first time I found how delicious a beverage might be made on

the banks of the lake of Geneva. Mine host of the Croix Blanche had seen the world; he had served in the Anglo-Swiss legion, and, after some months spent in the camp of Dover, had been pushed on as far as Smyrna, when the Crimean war ended somewhat prematurely for many who, like him, were ambitious of military fame.

One of the amusements at the châlet is target-shooting with rifles, at which M. Roud is a great proficient: he keeps a small store of weapons, and is always happy to try his skill with a stranger. I spent nearly a week in this Alpine Capua, where all was so beautiful that luxurious laziness nearly overcame the desire of going further, and where one is tempted to sing with the voluptuous Lotus-eater:

"Oh! rest ye, brother mariners, we will not wander more."

Fortunately, however, the "cacoëthes scandendi" returned, and we were enabled to have one more mountain expedition, before the end of the season. Cachat, after nearly two months of distinguished services, had been dismissed to Chamonix; but my friend and I resolved to return to Gsteig, and make the ascent of the Oldenhorn. The *pension* was broken up for the winter, and the rest of its inhabitants were escorted down to the valley by M. Roud, while we shouldered our knapsacks and recrossed the mountain to the foot of the Sanetsch.

The inn at Gsteig is decidedly dirty, and its landlord has a rough and somewhat disreputable appearance. We had no choice, however, and were consoled by a very tolerable supper of trout and roast mutton. A young man was found, who said he could show us the way up the mountain; and we went to bed with the seeming certainty of a fine day on the morrow. We started at six o'clock,

on the 20th of September, while everything around was crisp with the morning frost. For about three quarters of an hour we followed the route of the previous day, and then crossed the river near the châlets of Reusch, from which point we bent our steps southwards. A very narrow rough path led us rapidly upwards through the pine-forest on the west side of a noble ravine, down which tumbled a fine stream in many a fall and rapid. Sheep, goats, and cattle seemed to have taken an extraordinary fancy to us, and their numbers continually increased, so that we could scarcely avoid being pushed off the path by beasts that insisted on poking their noses into our pockets in search of salt or other eatables. Our guide was accompanied by a friend who had asked permission to join us, and our united efforts, with vigorous blows of alpenstocks, were scarcely sufficient to rid us of the importunities of a procession nearly as large as that which followed Noah into the ark. The question was finally decided by our arriving at so narrow a track round the shoulder of a precipice, that the larger animals could not pass; and the sheep and goats, apparently out of politeness, remained behind with them.

Soon after this, a sharp turn to the right brought us out upon the pastures of the Olden Alp, after an hour and a half from Gsteig. Leaving the huts of the shepherds on our left, we ascended a long and steep *arête*, or ridge covered with grass, from the top of which we saw the summit of the Oldenhorn exactly in front of us, apparently so near that we imagined it would be gained in less than two hours. From this point we kept a nearly horizontal course along the side of a slope, covered with the loose broken rocks which are precipitated from the cliffs on the right. Keeping the same direction, we then crossed a small

glacier, on the west side of which we began the ascent of the rocks.

This proved difficult work: not only was the general inclination excessively steep, but a great part of the rocks resembled giant staircases of broad steps covered thinly with loose rubbish, and so tilted up with the slope towards us, that we were often obliged to use hands and knees in climbing from one to the other. At one of these places my companion lost his alpenstock, which flew down many hundred feet before its course was arrested in a cleft. Had it been a common one, we might perhaps have abandoned it to its fate, but the trusty friend of five summers was not to be deserted in its hour of need. One of our lads was bribed to go down for it, and after a delay of half an hour it was restored to its delighted owner.

The same kind of work lasted for some time longer, when we came to an awkward-looking narrow gully on our left, surmounted by precipitous rocks. Across this we must pass, but a long stride was necessary, and the opposite side was extremely steep, and nearly covered with a coating of snow which had been converted into ice. Finding that our guides were not worth much, I crossed first, and contrived to get a tolerable footing by picking holes with the point of my alpenstock, after which I was able to lean down and give the others a helping hand. A few more paces, and we came to a more gentle slope, from which rose the last summit of the mountain. This peak is exceedingly steep, but so covered with a thick deposit of loose shale and stones that the progress, though slow, was certain, and at half-past eleven, or in five hours and a half from Gsteig, we reached the highest point of the Oldenhorn, about 10,285 feet above the sea.

There was not a cloud in the whole sky, and not a puff of wind strong enough to blow out a lucifer-match; so we prepared for a long enjoyment of our elevated position. Basking in the sun, we examined by degrees the whole horizon with the telescope, and found no small pleasure in reviewing the scenes of so many adventures. A better point could not possibly be found for the purpose. The Oldenhorn is nearly equidistant from Monte Rosa and Mont Blanc, and commands a splendid view of both of them, together with all the intervening Pennine Alps. As usual however at great distances, Mont Blanc appeared a far grander object than his rival: the latter is so surrounded with gigantic mountains, that Mont Blanc derives a great advantage from his solitary magnificence. With a good glass, the whole chain may be accurately studied from the point where we now reposed. All the southern valleys, with their terminal glaciers, mountains, and passes, were laid out before us, as in a map: the Combin was particularly grand, and the Ferpêcle glacier, with the Col d'Erin most distinctly traceable through all its length. Looking in the opposite direction, we could see all the lovely scenery in which we had spent the past week spreading in verdure and freshness round the broad sheet of the lake of Geneva, and sixty or seventy miles away the lake of Neufchâtel, and the long undulating ranges of the Jura terminated the view.

Time flew rapidly while we were engaged in storing up in our minds the new geographical knowledge which one such day as this adds to the previous stock, and we made no attempt to leave the summit till we had spent two hours and a half upon it. And now came an important question. We had by no means enjoyed some of the

scrambling work up the rocks, and resolved if possible to return by another route. While engaged upon so many distant objects, we had not forgotten to examine the Sansfleuron glacier at our feet, which extends in an easterly direction from the tops of the many-crested Diablerets to the neighbourhood of the Sanetsch pass; and we thought that it would be very desirable to descend to this glacier and traverse it to its base, whence we might contrive to join the Sanetsch route to Gsteig.

The nearest part of the ice was, I imagine, about 700 or 800 feet below us, but we knew there would be no difficulty in descending to it down the shaly side of the summit; and on examining the nature of the crevasses through the telescope, they did not appear very formidable. Accordingly, we told our guides that we should go that way. They seemed utterly astonished, declaring it was impossible, and that the only man who had attempted it was lost in a crevasse. We were quite accustomed to this sort of nonsense, and I told them we had made up our minds, and should go by ourselves if they did not choose to accompany us. "Sie gehen allein?" was their exclamation, followed by the laughing but decided answer, "Jawohl, wir gehen allein!" While they indulged in a little useless blustering, we settled the matter by getting on our legs and preparing to start. They hesitated a few moments longer, and then followed us in a very sulky manner.

We soon descended over the loose stones, and came to a steep slope of hard snow which led down to a smooth part of the glacier. Selecting a place where we could see that there was no *bergschrund* at the bottom, we ventured on a glissade, which in an instant landed us on the upper region of the Sansfleuron. The valiant men of Gsteig followed

us in fear and trembling, and we derived no small amusement from the unusual task of showing the natives how to travel on a glacier. As the crevasses became larger than at first, they evidently disliked the work, but by a little proper management we got on famously. Presently, as we looked across the plateau of spotless snow on our right, we fancied that we saw a large party of men in the middle of it; nothing, however, could be much more improbable, and we soon discovered that the figures were those of a herd of chamois camping out on the snow, at about four or five hundred yards' distance. With the aid of the glass we could see all their movements. I counted thirteen, some standing and some lying down; they were evidently watching us, and twitching their heads and ears exactly like a group of deer. We were, I suppose, too far off to excite any violent apprehension, for they did not attempt to leave their places as we passed on our way.

I have no doubt that, by following the snow-field towards the west, it would be perfectly easy to reach the summits of the Diablerets; and, if time had allowed, we should have made the attempt; but in the latter half of September the days are short, and we were obliged to continue our course down the glacier, keeping rather to its northern side, and thinking what a fine day's sport the chamois would have afforded to a hunter.

As we advanced, the crevasses became larger and larger, but were of such a nature that there was seldom any great difficulty in finding practicable ice-bridges, when they were too wide for a bold jump. We found great amusement in showing our guide and his friend how to test the security of these places, and the obstinacy produced by their ignorance gradually gave way to genial good humour, as they

found themselves becoming familiarised with a new system of progression. About half an hour after seeing the large herd of chamois, I saw a dark brown spot with a white streak in the middle, which I instantly knew to be the head of another chamois, looking straight at us from the further side of a crevasse, which, being a few feet lower than where we stood, concealed the rest of his body. Without making the least sound, I drew the attention of my companions to it, and we advanced very cautiously. Presently the head rose, and away bounded a splendid beast, not more than forty yards from us; he was followed almost immediately by his wife and child, and the whole family seemed so taken by surprise that they knew not what to do. They circled round us in a gentle canter, and would have been almost certain victims even to a charge of swan-shot; but at last they made up their minds, and went off bounding away at full speed to the mountains on our left, which separated us from the Olden Alp. This was one more of many instances I have met with to prove what a quantity of sport may still be met with by those who will take the trouble of searching the most unfrequented glaciers of the High Alps; and I would confidently advise any one ambitious of such a pursuit to take a rifle, obtain the government licence, and hunt the mountains from the Wildstrubel to the Diablerets. At present, the only pass which is at all frequented in this neighbourhood, is the Pas de Cheville, between Sion and Bex, but this does not anywhere touch the glaciers. Those who cross the Rawyl and Sanetsch passes, and explore the mountains and glaciers right and left of them, will find new ground and new fields of excitement.

We selected our route so as to leave the most crevassed

portion of the glacier on our right, and proceeded with tolerable ease down to the very foot of the ice, but here, as not unfrequently happens, we found the greatest difficulty in getting off the glacier. Every where the ice terminated abruptly in a steep curve, in many places cut up by deep blue crevasses, generally in the direction of the glacier. We had no axe, and were therefore prevented from cutting steps for the feet. At last I found a place where, by letting myself down into a crevasse, and clinging with my elbows to the ice on each side, while I made small resting-places for my feet with the point of my alpenstock, I succeeded in reaching terra firma, close to the side of a small lake formed by the melting of the glacier. The others followed by a slightly different course, and we soon stood together on a slope of turf just over the head of the Sanetsch pass.

Our work was over, but not so our pleasure, and we paused once more to admire the wild sublimity of the scene around us. Turning from the beautiful Sansfleuron glacier which we had just left, our eyes were arrested by the prodigious precipices of the Sanetschhorn, from which monstrous blocks had been precipitated in former catastrophes, and which threatened at the slightest shock to hurl down a supply sufficient to blockade the pass. On our right rose up singularly wild and fantastic precipices, leading to the Gelten glacier and the summit of the Wildhorn, and all around our feet was the broad expanse of uneven turf, over which is the path from Gsteig to Sion.

With our faces towards the former place we followed a somewhat dubious track for about half an hour, for, where the ground affords a choice of route, the passers-by are pretty sure to give their successors a great variety of alternatives; but we soon came to where the path had

been conducted down steep and regular zigzags by the side of the mountain torrent. The ravine leading towards the Saanenthal is truly worthy of the pencil of Salvator Rosa: rocks hurled by the various forces of the elements obstruct the way in many places, and here and there we found the torrent nearly choked with the stems of giant pine-trees washed down by floods, over which however it went leaping and bounding with frantic energy towards the valley below. As we advanced, the sun set in perfect beauty; the orb itself had long been hidden by the intervening heights, but the Spitzhorn on our right, and the Sanetschhorn a little behind us on the left, glowed with imperial purple. The shades of evening were dark in the valley, and the dew had already settled in large pearls on every blade of grass as we reached the inn at Gsteig, exactly twelve hours after leaving it in the morning, four of which had been occupied in the descent.

We spent another night at Gsteig, and on the following morning returned to Lenk, where we found our old friend Matthie very busily engaged in bringing down his goodly stock of fresh cheeses from the huts on the high pastures. The perfect cleanliness of his house was a pleasant contrast to the dirt of Gsteig, and we passed a very merry evening with the whole family. Unfortunately it was to be the last that we could spend together for some time to come. Early next morning Matthie drove me down in his car to Zweisimmen to meet the *diligence* for Thun, while my companion, hoping still for a continuance of the fine weather, took up his knapsack to walk southwards over the Rawyl.

THOMAS W. HINCHLIFF.

CHAP. XIV.

A NIGHT-ADVENTURE ON THE BRISTENSTOCK.

I LEFT Lucerne one dull summer's afternoon in the month of July, 1857, accompanied by Mr. Hardy and Mr. Ellis, and attended by an English lad whom we named Fortunatus, intending to encounter no difficulties more formidable than those of the St. Gotthard Pass. From Flüelen we walked on the same evening, through mist, mud, and mire, as far as Amsteg, where we quartered ourselves for the night. The next day the rain fell in torrents, and we were driven consequently to the orthodox modes of whiling the hours away. We did reading, writing, and arithmetic; we played whist, discussed the weather, and, finally, achieved a stroll along the high road. Towards the close of our afternoon ramble, two facts became apparent, the one highly satisfactory, the other very much the reverse. On the favourable side of the account, we perceived that the tops of the mountains were beginning to appear through the clouds, thus encouraging us to hope that we might, without difficulty, attempt the Pass on the following day; while on the unfavourable side, we found that Ellis gave unequivocal signs of being unwell, and unfit for work. He was desirous of proceeding, but this we would not allow, and insisted that he should remain a day at Amsteg to recruit. Just as this point was decided, the sun came out brilliantly, and on the east side of the valley, immedi-

ately over head, a magnificent peak rose proudly aloft, towering above the clouds, and glowing with the sun's declining rays. It was speedily decided that while our companion remained quietly at the inn, we should on the following day attack this remarkable looking mountain. We thereupon returned to the inn, made inquiries, ascertained that our peak was a little over 10,000 feet in height; that it was called the Bristenstock, and could be ascended in six hours. As usual, the landlord was fortunately able to recommend to us most excellent and trustworthy guides. To this suggestion we opposed a most decided veto; the landlord shrugged his shoulders, and incoherently spake of avalanches and crevasses; but we were resolute and not disposed to yield. Arrangements were at once made. Hardy and I were to start on the following morning at five; we reckoned six hours up, four down, two hours for loitering — an easy day's work; and, accordingly, dinner was ordered punctually for six o'clock, Ellis and Fortunatus remaining ingloriously below.

A few minutes after five o'clock, on a most lovely morning, we left the hotel in light marching order, unencumbered either with waistcoats or neckties, and carrying a knapsack containing but one bottle of wine and one lump of bread; for we intended thoroughly to enjoy our six o'clock dinner. Through thick pine forests, and over Alpine pastures, we passed rejoicing, occasionally catching glimpses of the bay of Uri, which, from its unrippled bosom, reflected many a cragged and woody headland; sometimes gazing down upon that highway of nations which, "like a wounded snake, dragged its slow length along," and in the deep valley beneath us threaded the narrow defile that leads to the Devil's Bridge and the St.

Gotthard. As we now and then traced the sluggish course of some early *voiture* that crawled reluctantly upwards, we speculated upon the probability that its inmates were "doing" Switzerland *en grand seigneur;* and after the manner of our old friends, Brown, Jones, and Robinson, with their eyes closed in peaceful slumber, were dreaming of the past rather than admiring the present. Far different, indeed, were our feelings; we both most thoroughly enjoyed our stroll, for hitherto our ascent appeared nothing more, and so rapidly sped the time, that it seemed as if but a few minutes had elapsed when at half-past ten we emerged from the thick pine-wood shade upon the open space of the upper pastures. Here the genius of the spot welcomed our approach with his balmy and invigorating breath, which, richly laden as it was with the sweet perfume of the black orchis, that fragrant weather-glass of the Alps, heralded a day of summer beauty worthy to succeed the soft grandeur of the early morn. Here, too, the pink rhododendron, or alpine rose, blossomed profusely, sometimes grouped around the blighted and stunted fir-trunks, and sometimes scattered about some broken mass of moss-clad rock, that the avalanche of a bygone age had hurled from its lofty resting-place down upon the pasturage below.

The prospect even here was most striking, and we repeatedly sat down upon some projecting crag lost in admiration of the scene. We could now look up to the head of the Maderaner Thal, where from amid the wild crags of the Clariden Grat came tumbling down the beautiful glacier of Hüfi; further in the back-ground arose the mighty mass of Tödi, clothed with dazzling snows, while close at our feet lay the fair little Bristen-See, as suggestive of peace and quiet as the bold forms that surrounded it

were of the tumult and war of the elements. Hardy was completely fascinated, nor, indeed, was it otherwise with myself; but, perhaps I was rather more impressed than he with the extreme value of time on these mountain excursions. Be that as it may, my companion had but little difficulty in persuading me to lie down with him on the pleasant sward, and there take our time in gazing to the utmost. The luxury was intense, although it cost us rather dear, as luxuries sometimes do.

Up from the valley came the sound of distant church bells, reminding us of home, even in scenes so different; and as we indolently chatted on, with the warm bright sun gladdening our hearts, and the air though perfectly still yet fresh and clear, such a feeling of perfect calm and happiness came over us that we almost resented the suggestion made by an inexorable necessity, that we should be on the move. "Come, come, this won't do, this is not the way to get to the top of a mountain; we must push on a little faster." Thus was poetry displaced by prose, and our contemplative mood succeeded by a stern reality.

We now approached a glacier embosomed in a vast hollow on the northern side of the mountain, and leaving this to the left crossed the moraine which, running in a north-westerly direction, has been deposited at some period when the glacier was more extensive than it now is. We then began quietly to climb the rocky ridge by which the glacier is bounded on its western side; but soon both hands and feet were brought into play; the ridge was steep, the ground was loose and treacherous, and precipitous were the rocks, both to the right and left; crag after crag was surmounted, yet ever and anon we lingered to gather specimens of the Alpine Flora, to feast our eyes on the

distant peaks as they gradually rose into view, or to examine the strange and varied composition of the rocks which perpetually arrested our attention. And as usual in these mountain climbs, each headland as it cut sharply against the clear blue sky immediately above us, gave hope that the summit was in view; but again and again were these deceptive peaks reached, surmounted, and left far below us, while again and again another and yet another succeeded.

We had now had about three hours of this style of travelling, and were crossing frequent patches of snow, when, finding that it was already three o'clock, we began to get a little anxious as to time. "It is getting late, Hardy; it would be better to give it up and return, for we have many an hour's work behind us." "No," was Hardy's reply; "after coming so far, we'll never give in now; see, there is the top! another twenty minutes and we are there." I yielded, although sundry doubts crossed my mind in respect of the twenty minutes. "I don't like to give in any more than you, but it is a question of time, not of fatigue, and darkness in the pine woods does not afford the pleasantest travelling in the world; and there are softer pillows than the roots of a fir-tree."

At length the summit was gained; time, just 3.53. We sat down, cooled our wine in the snow, revelled in the contemplation of the glorious panorama, and, heedless of time or of the work that was yet to be accomplished, were most thoroughly happy. We finished the wine and nearly finished the bread,—there was but a small piece left, about as big as a man's hand, which Hardy was about to leave behind, but "Put it in your pocket," I suggested, "it may yet be wanted."

And now hurrah for the descent! "I say, Kennedy," said my companion, "it's twenty minutes past four already; we must set to work in earnest. Don't you think that we had better try a different line of country? look, down that gully we could get on capitally!" "Humph! yes, it's all very well as far as we can see; but it's rather foolhardy to try a new route at this time of day." "Don't make bad puns on my name," was the reply; "there's no time for that—now, what are we to do?" We decided on trying the new route. I cannot say whether we were bold and self-reliant, or rash and self-conceited; we have thought of the matter since, and have never yet arrived at a satisfactory solution.

At 4·20 P.M. we commenced descending the northern face of the mountain, taking a course directly towards the small glacier far below us, that lies on a shelf in the face of the mountain turned towards the Maderaner Thal. We started at a rapid pace. At first, and perhaps for half an hour, there were traces of what with a laudable stretch of imagination we facetiously called a path; but which was in reality the bed, either of a torrent or of an avalanche. This indistinct appearance however soon vanished, and we descended by sheer climbing, generally one at a time, while the other held the poles, and frequently we were brought to a complete standstill. It was at one of these stoppages, when I happened to be first, and was sorely puzzled how to make any progress, that I heard Hardy's voice above me, talking in a sanguine strain of the supper that was to reward our exertions. I did not contradict him, although unpleasant misgivings passed through my mind as to the chance of the promise being realised. The careful reader will doubtless have perceived that our antici-

pated six o'clock dinner was now postponed to a certain, or rather uncertain, indefinite supper; while if, as I suppose, he be also an experienced mountaineer, he knows the value of an evening meal after a hard day's work. Bearing this in mind, he will the more readily sympathise with us in our subsequent privations. At length, after a descent of two hours, during the whole of which our energies, both mental and bodily, were taxed to the utmost, we appeared to be not more than 600 feet above the upper part of the glacier where it was separated from the rocks by the usual *bergschrund*. Many of my readers have, doubtless, crossed the Strahleck, and remember the famed descent of the Wall at the head of the Finsteraar Glacier on that glorious pass. Let them imagine that Wall, variously estimated as it is at from 500 to 800 feet in height, about five times magnified in height, and greatly increased in difficulty, and they will have a just idea of this face of the Bristenstock. We were at this moment apparently in the position of the traveller at the top of the Strahleck Wall, but with this essential difference, that we had already made a descent of some 2000 feet, and that the portion beneath us was quite impracticable. It had been our intention to reach the glacier below us, and then to cross it diagonally in a north-westerly direction, so as to reach the lower extremity of the western lateral moraine. From the spot where we were standing, however, the wall of rock appeared to go sheer down to the ice; there was no mode of descent that we could possibly discover, and on neither hand could we discern foothold even for a chamois. I saw that there was nothing to be done where we were, and that it was impossible to remain much longer clinging to the slippery ledges of these precipitous rocks. I briefly in-

formed my companion of the real state of the case, and told him there was but one course open to us—to return as quickly as possible to the top of the mountain. He expostulated; representing the impossibility of clambering again up the face of the precipice where we had frequently dropped from one ledge to another, and urged besides that there was no chance, if we returned to the top, of getting back to the inn that night. Of course I knew that our prospect of bed and supper for that night had disappeared, and that if we did come down the mountain, it would be in a way that would leave us no further occasion for those luxuries; difficult as the ascent might be, it was the only course that remained to us; and when Hardy at last saw the serious nature of our position, he at once cordially agreed to face the disagreeable alternative that was before us.

With that we began our work in earnest; our council of war did not, I believe, occupy more than two minutes; we set our faces to the rocks, and, during those rare opportunities in which they gave us any freedom of motion, we pushed on faster than at any former part of our expedition. So steep was the climb, that at times I stood on a narrow ledge with my fingers in clefts of the rock, and with my breast pressed against its face that I might not fall backwards, while Hardy climbed up and stood upon my shoulders, so as just to reach some projecting fragment, and after drawing himself up, would lie down, and stretching out his hand to me, help me to place myself alongside of him. Just before reaching the top, we bore to the west, so as to cross the ridge by which we had ascended, about a hundred feet below the summit. But the sun had now set, and our present object was to

descend rapidly and thus get as low as possible before it became quite dark, so as to diminish the cold that we should experience in the night bivouac, which we both knew was inevitable. We again neglected our old friend the ridge by which we had mounted, because it was not steep enough, and was necessarily exposed to the blast, and we rapidly descended the west face of the mountain, which immediately overhangs the St. Gotthard Road. When about five hundred feet from the summit, there was not sufficient light for further progress, and, indeed, had we succeeded in continuing our advance, we should as it proved have found no spot whatever whereon we could have stretched our limbs. As it was, we selected a ledge running north and south, probably the only available locality on this face of the mountain, about four feet and a half wide, and eight long, bounded on the east by the rock, which rose perpendicularly, and terminating on the western side by the cliffs which fell from it precipitously towards the valley. On this exposed side, we built a wall about eighteen inches high, as a guard against a roll over in the night, and also as some protection from the wind. We levelled our bed to the best of our ability with nice and smooth stones, selecting some particularly fine specimens for our pillows. Hardy wickedly reminded me of the disparaging tone in which I had talked some hours earlier of the roots of fir-trees, regarded as pillows, and asked whether I should wish for one now? Of course all I could say was that "Tastes might differ, but that on the present occasion I preferred stone pillows." Hardy produced the lump of bread which he had fortunately saved; a portion of it was reserved for breakfast on the morrow, the remainder we shared for supper; and we eagerly drank

from a streamlet that trickled close at hand. Our frugal meal was soon despatched, but the preparations necessary for completing our bed had occupied some time, and it was now dark, so we agreed to turn in for the night.

We were obliged to use the greatest care in this operation. First one made himself comfortable, then the other cautiously placed himself alongside and endeavoured to do likewise. Although we agreed that, in order to avoid the risk of falling over, we would not both sleep with our back to the precipice, yet ever and anon as we leaned a little against our fragile wall of stones, one or two of them would become displaced and go bounding away into the valley some thousands of feet below. Thus we reposed, locked in each other's arms like the babes in the wood, whom the robins covered with leaves; only, in the present case, there were no babes, and no wood, and no robins, and no leaves. For a long time we were sleepless, and yet not inclined to talk; the stars were shining brilliantly in the black vault above, and never, I think, in all our rambles, did grandeur and sublimity make themselves so impressively felt. We were fully aware of the difficulty of our position, and of the imperative necessity for coolness and self-possession, should fog or bad weather come on. Not for one moment, however, did either of us, I believe, feel doubtful; and it was probably this self-reliance, this hardly-acknowledged fact, that our energies would be taxed to the utmost, and that our nerves must be fully strung to meet and overcome every obstacle, that added so greatly to the unusually deep solemnity of that hour. Perhaps neither of us had ever before felt so immediately under the protection of a Higher Power as we did on that night. We were alone upon the mountain,

far away from the haunts of men, and it seemed as if we two, with the eyes of Heaven looking down upon us, must have been in some especial way under the care of Providence. It may well be that both of us then realised, more than ever before, that genuine trust in an Omnipotent Power, which, while confiding the ultimate results to Him, yet leads its possessor to the distinct recognition of the necessity of bringing into play his own activity, his own energy, and even his own self-reliance. Strange too as it may appear to many, notwithstanding all the discomforts of our couch, we yet, throughout that night, experienced a certain sensation of enjoyment and satisfaction. At frequent intervals we rose by mutual consent, stamped our feet upon our stony bed, for we did not dare to move six inches in any direction, and beat our arms after the fashion of London cabmen in cold weather. At one period of the night, when we both felt more than usually cold, I remember that Hardy quietly related to me, how, prior to his departure from England, certain advice had been given him by a most valued member of his family. It appears that on one or two occasions he had suffered rather severely from rheumatic fever, and his respected relative had therefore rightly cautioned him to avoid carefully all exposure to night air, and every risk calculated to encourage another attack. "What," said Hardy to me, "would the dear old lady think if she could see me now?" It is, however, a remarkable fact that since that night Hardy has enjoyed more robust health than ever, and laughs to scorn all idea of an attack from his ancient enemy. Dare we go so far as to recommend all who suffer from rheumatic fever to try a course of Bristenstock treatment? Let the reader determine.

At length the long wished for morning broke; with the first dawn we were stirring, but were obliged to stamp about our narrow platform for some twenty minutes, in order to restore circulation, or we should not have had sufficient steadiness to have continued our descent in safety. We had not the slightest appetite, but compelled ourselves to eat the last morsel of bread, while, unfortunately, we had no means of moistening our lips, for the water that had on the previous evening trickled past, was now frozen, and in such cases a lump of ice in the mouth seems to give little or no relief.

Now, one might have supposed that the lesson of yesterday would have sufficed, and that we should have taken care to have followed the ridge by which we had ascended. Not so, however; instead of returning to the track which we knew, half wilfully, half carelessly, we suffered ourselves to be tempted by apparently easy places, and thus to leave the ridge at every step still further and further to the right. And so we continued our course down the western face, the whole of the descent being exceedingly arduous, although, perhaps, in consequence of our being somewhat exhausted, the difficulties might have assumed an appearance of greater magnitude. Our principal discomfort was want of water, which we did not find until about six o'clock.

Two hours passed away, and we seemed to be nearing the grass slopes, and to be getting into easy ground. Too soon, however, we were undeceived, for our ridge terminated suddenly in sheer precipices, at the very edge of which we pulled up, and gazed over at the river Reuss, foaming in his rocky bed some 5000 feet below.

The Bristenstock is made up of thirty or forty of these main ridges, each of which appears to break off near its summit, into as many more minor ones, and these again are similarly subdivided; the whole group of rugged ridges of ragged rock, irregularly radiating from the craggy crest of the mountain. Not more than two or three of these are practicable, and, as it afterwards turned out, we had got upon one which was about the eighth main ridge in a westerly direction from that which we had intended to follow.

We now made a rather troublesome descent down the northern side of the ridge into a watercourse, where we were very glad to get our morning draught, and then ascending to the next ridge essayed a fresh descent along its edge, but were again cut off. After three similar attempts, and, so far as we can judge, about noon, Hardy suggested that our best course would be simply to cross ridge after ridge, without attempting to descend until we came to our own original track. The plan was forthwith put in execution, and just after we had surmounted the one nearest to us, and were examining the next succeeding one, we most happily descried thereon a small goat track, which seemed tolerably easy. We made for this at once, and found to our no small joy that it was an excellent foot-path, excellent indeed, compared with the abrupt rocks and steep gullies among which we had now been for some sixteen or eighteen hours constantly clambering. At the same time it was but a goat track, and even here we could not allow our eyes to wander from the small spot whereon at each step we were to plant our feet. We were thus conducted along the edge of the precipices, turning the ridges in the most satisfactory style; and finally, about

2·30 P. M. congratulated ourselves upon at last treading upon the much-desired grass slopes.

Now that the excitement of difficulty was ended, we became conscious of hunger and fatigue, and we did not much relish the long walk over ground that on the previous day had afforded so much enjoyment. However, there was nothing for it but to push on, for we were still 5000 or 6000 feet above the level of the sea, and some hours from the hotel; we therefore made way as fast as possible towards some distant châlets, in the hope of there recruiting our somewhat exhausted energies with a little bread and milk. But this was a day of disappointments, and when we reached the huts they were utterly empty. We were the more vexed because (as we imagined) we had left our direct route, a conjecture, however, in which we were mistaken, for after stumbling about rather at random among the alders and brushwood, we met with two small goatherds, who directed us back again to the châlets, behind which was a good beaten path leading straight through the pinewoods to Amsteg.

In the meantime Ellis and Fortunatus had been exceedingly uneasy. They closely questioned the landlord, who admitted that neither he, nor any one else, knew anything about the mountain, that the professed guides had never reached the summit, and that, so far as he was aware, only one man had ever been there, and he was killed. Cheering intelligence this for our anxious friends! However, they engaged men to seek for us, while they themselves proceeded in every direction, that they thought we could have taken. Ellis found that the men were utterly useless, for in positions where there was any serious difficulty, they fell back in alarm, while he himself, although quite

unused to Swiss mountains, was obliged to take the lead. We had just quitted the region of open pasturage, and were travelling rapidly along the path that led directly through the pine woods towards our destination, when we met with one of these searching parties. Well do I remember the cheery voice of the lad Fortunatus, as I heard him singing out to me from below: "Oh! is that you, Mr. Kennedy, I am so glad." Ellis was not with them, as he had gone in another direction, and, in his anxiety to find us, would doubtless have continued to the very top, and probably entirely alone, had we not sent forward one of the men that we had just met, to put a stop to his further search. We swallowed the wine that the first party had brought with them, and then continued our descent. When approaching the village, young Fortunatus urged us to hold ourselves up, and not appear tired out, a piece of advice which we most carefully adopted, although I imagine our step would have been equally firm had it not been given. The lad was anxious that we should honourably sustain the English character for pluck, and I hope we did not fail. Finally, we reached the hotel just at 5·0 P.M., after an absence of thirty-six hours. Ellis came down from the mountain in good time, and, after a refreshing wash, we proceeded to make amends for our long fast. Although the feast was twenty-four hours later than we had anticipated, we all most thoroughly enjoyed our dinner, which was seasoned with more than one extra bottle of wine.

Thus ended our excursion; and so pleased were we with it, that, in the following year, Hardy and I acted as pioneers to a party of friends, and introduced them to the summit where these adventures had befallen us. Messrs. Koe, Stephen,

Hinchliff, and Fortunatus started, but Hinchliff's foot had become so excoriated that, to our great regret, he was obliged to leave us at an early period of the day. Fortunatus was left behind about one hour from the top, while the rest of the party pushed on, and were rewarded with success. The time occupied in the excursion was fourteen hours, including stoppages.

A week after our first ascent, Ellis and Hardy were at the hotel on the top of the Faulhorn. During the table-d'hôte dinner, an elderly personage, who was evidently more impressed with the dangers than with the beauties of Switzerland, inveighed, in no measured terms, against the folly of attempting to travel without guides. He instanced the danger of the St. Gotthard Pass, and added force to his observations by narrating the melancholy fate of two promising young men who, while attempting that feat, had perished miserably on the Bristenstock. "In fact," continued he, "according to my informant, nothing was found of their mangled corpses except some small particles of blood-stained clothing." "That," quoth Hardy, "I can well understand, for I am one of those unfortunates, and I remember that, in many parts of the climb, I was obliged to sit down and allow myself to slide over the rocks, so that I afterwards found myself minus a portion of my nether integument, and these, no doubt, are the patches of raiment, the discovery of which you relate."

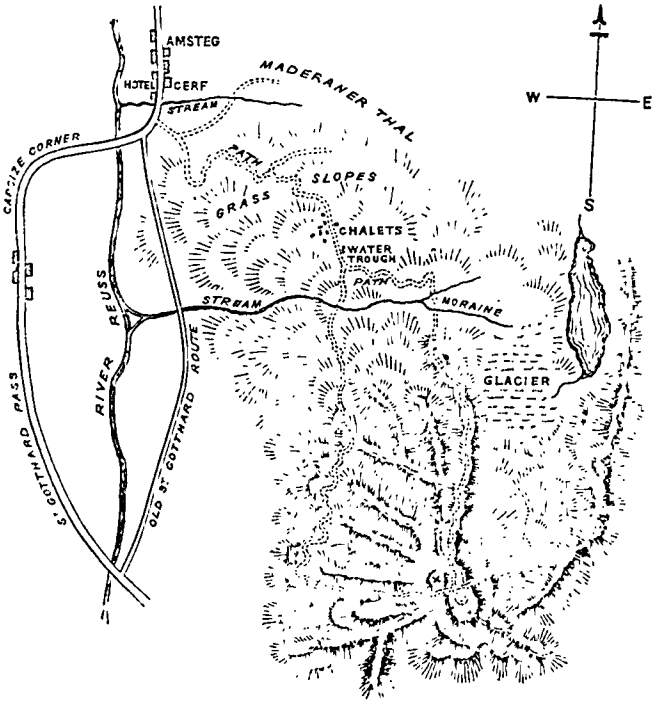
I would strongly advise every mountain climber to make this ascent. The whole of the route is most interesting, and the view from the summit exceedingly magnificent. Looking northward, he will see the Bay of Uri at his feet, with Pilate and the Righi far below him; while immediately in front, and at the opposite side of the Maderaner

Thal, are the crags of the Windgelle; towards the east and south-east, the Clariden Grat and Tödi, backed in the far distance by the Ortler Spitz; while sweeping away to the south-west, he has Monte Rosa, the Weiss-horn, and the whole eastern extremity of the Pennine chain; and on the west and north-west, the Titlis and Uri-Rothstock, surmounted by the peaks of the Oberland. If the traveller take a guide, he will probably fail in reaching the top, although he may have the melancholy satisfaction of adding one stone to the pile which has doubtless, in accordance with custom, been raised to commemorate the sad fate of the two Englishmen who perished in their mad attempt. But if he go without guides, accompanied only by a friend, he will, if favoured by weather, and if tolerably accustomed to mountain ascents, hardly fail of success.

To any one who may be disposed to make the attempt, I offer the following brief instructions. Immediately after leaving the hotel at Amsteg, you should cross the bridge which spans the stream from the Maderaner Thal, and directly turn to the left, carefully avoiding, and afterwards keeping above, the old route of the St. Gotthard Pass; then, almost immediately, the ascent commences by a good zig-zag path, bearing a little to the right, and taking generally a south-easterly course. This path may frequently be left, and tracks made through the pine woods, always bearing in mind that, from the base to the summit, the route, without exception, is south-east and south. Emerging from the pine woods close to some deserted châlets, with a wide extent of pasturage before you, and the summit directly beyond bearing nearly south, you should gradually ascend across the pastures, towards the glacier on the northern face of the mountain. You climb

the grass slopes and rocks to the west of the glacier, keeping it, so far as possible, always in view towards your left. Never be tempted to seek an easier route by descending towards the west, but in every difficulty keep to the left, and up towards the highest parts of the ridge. Do this, and, with good climbing, success is almost certain.

E. S. KENNEDY.



PLAN OF THE BRISTENSTOCK.

× Sleeping Place.

ALPS OF GLARUS

And Part of the

NEIGHBOURING CANTONS

CHAP. XV.

THE BATHS OF STACHELBERG, AND THE HEIGHTS AND PASSES IN THE VICINITY.

THE KLAUSEN PASS.—THE KLÖNTHAL.—THE TÖDI.—THE PASS OF THE SAND GRAT.—THE SEGNES PASS.—MARTINSLOCH.—THE CALFEUSER THAL.

GLARUS* is very little known to the British tourist, and yet there are few cantons in Switzerland which are more worthy of being visited. I shall leave to others the description of its manufactures, its exports, its minerals, and its agriculture. I shall not attempt to give a history of its Landesgemeinde, the most complete democracy in Europe, the sovereign power being vested in all males above the age of sixteen. I will not dwell on the battle of Näfels, the Sempach of this part of Switzerland, at which an army of 6000 Austrians was entirely cut to pieces by 500 heroes of Glarus, aided by a few shepherds from Schwyz, the anniversary of which event is kept every year on the battle-field, on the first Thursday in April. I shall only glance, in the most cursory manner, at the attractions the country

* Glarus, sometimes spelt Glaris, is a corruption of Hilarius, a saint to whose honour a shrine was built in these mountains, by an Irish monk named Fridolin. He was the chief founder of the convent of Säckingen, on the Rhine, whose abbess was long, *virtute officii*, Sovereign Princess of Glarus.

possesses for the sportsman and the geologist. My desire is, chiefly, to describe what I was myself best able to appreciate, namely, its objects of interest to the pedestrian. The baths of Stachelberg are the most convenient head-quarters for any one who wishes to explore the Valley of the Linth and its neighbourhood; and a more agreeable place to spend a few days at, I can scarcely imagine. Here you have fine scenery, excellent accommodation, and moderate prices; to which I would add, an unlimited supply of water—no small consideration to an Englishman. In addition to the mineral spring, which is in great repute, and is a concentrated alkaline sulphureous water, there is a wonderful shower-bath, which is always running, and is formed by a portion of the stream that descends from the Braunberg, brought for the purpose into a wooden hut at the back of the baths.

As Stachelberg is rather out of the beat of the generality of travellers, it may be desirable, before proceeding any further, to state from whence, and in what manner, it may be reached, and also, indeed, left; for I believe that it is not an uncommon thing to say, that it is very easy to get into the canton of Glarus, but that there is no getting out of it again!

First, for elderly gentlemen, there is an excellent carriage road from the Lake of Zürich, by Näfels, commanding at intervals a fine view of the Tödi.

Then, there are the passes of the Klausen and the Klönthal, by both of which the Linth Thal may be approached, on horseback as well as on foot. The Klausen, which is the pass from Altdorf to Linththal, requires about ten hours to walk or ride, from point to point, including an hour's halt. I had the pleasure of doing this in the month

of September, 1857, in the company of two ladies, and I did not, therefore, diverge very much from the beaten track; but a most interesting excursion may be made from Unterschächen, the third village you arrive at after leaving Altdorf, to the glacier which descends from the Gross Ruchen, in the maps of Studer and Keller erroneously called Rüchi.* We met two German artists near the pretty fall of Staübi, on their way from Stachelberg, who intended to make a forced march by the Ruchen into the Maderaner Thal, and thence return to the Linth Thal by the Clariden Grat; but as we did not see them at Stachelberg, I presume that they could not accomplish their object.

The culminating point of the Klausen Pass is attained by a zigzag path up an alp called the Balmwand, where there is a solitary châlet. The pedestrian may gain half an hour by crossing the stream and ascending a very steep path to the left; this I did, and by getting up to the top of an eminence nearly due north, and at right angles to the pass, I obtained a magnificent view of the Windgälle and the Clariden; the Gross Ruchen is not seen from this point, being hidden by the Scheerhorn, a grand peak which forms the north-western boundary of that mass of ice and snow, which is terminated on the south-east by the Piz Rosein and the Bifertenstock.

At Urnerboden, a prettily situated village with a small inn, we met the curé of Linththal, who very kindly accompanied us as far as Stachelberg, and gave us on the road

* The Gross Ruchen is 10,304 feet high; the Rüchi, which is much further to the east, is nearly 1000 feet less.

The heights in this paper are given in English feet, reduced from "Zieglers absoluter Höhen der Schweiz;" and are all from the sea level, unless otherwise specified.

much valuable information, pointing out many objects of interest which might otherwise have escaped our observation.

Amongst other things, he explained to us the mode of making Schabzieger cheese, for which the valley of the Linth is so celebrated. As its name implies, it is chiefly composed of the milk of goats. Its peculiar taste, smell, and colour, are derived from the blue melilot (*Melilotus cærulea*), locally called *klee*, which is found in great quantities in the neighbourhood. The herb is dried and ground to powder, and then mixed with the curd, in the proportion of about 3 lbs. of klee to 100 lbs. of curd.

It is a lovely walk from Urnerboden down to Linththal; the path is on the left bank of the Fätschbach, which makes a series of cascades before rushing into the Linth, the last, in the midst of a thick forest of beech-trees, and backed by the purple rocks of the Kammerstock, is exceedingly fine.

The Klönthal Pass, also called the Pragel, leads from Schwyz to the town of Glarus. In point of distance it is rather longer than the Klausen, but it may be done in about the same time, by going part of the way in a char. Its chief beauties are in the vicinity of the Glärnisch, a precipitous mountain, the table-land at the top of which is, in great part, covered by glaciers. The picturesque little Klön-see washes the northern base of the Glärnisch, which is almost perpendicular on this side. The Klön-see itself is well worth a visit, and makes a very pleasant excursion from Glarus: but, on the whole, the scenery of the Pragel is not so fine as the Klausen, and I was rather disappointed with it.

The passes from the canton of Glarus into the valley of

the Vorder Rhein in the Grisons are, the Sand Grat or Tödi Pass, the Kisten Grat, the Panix, and the Segnes, all of which are towards the south.

There are three passes into the canton of St. Gall: 1st, the Flumser, from Engi, and also from Matt, in the Sernft Thal to Flums; 2ndly, the Riseten, from Matt to Sargans, an easy, but, I am told, an uninteresting pass; and 3rdly, the Ramin or Foo Pass (called Riseten in Leuthold's map), from Elm to the baths of Pfäffers, by Weisstannen and the Calfeuser Thal; all these are towards the east.

There is also a pass to the north from Glarus to Murg, on the lake of Wallenstadt, a very beautiful walk, passing immediately under the Mürtschenstock, a rugged peak which every one who has seen it from the deck of the steamboat on the lake must have wished to become better acquainted with. The Mürtschenstock is easily ascended from Glarus, by following a path to the left of the Schild, to the Fronalp, a mountain of great interest to the geologist, from its singular formation, where there are some châlets, and beyond which it would not be advisable to proceed without a guide. The Mürtschenstock may also be reached from Filzbach, on the lake of Wallenstadt, by a path over the Kerenzenberg, which would be another route by which the pedestrian might reach Glarus from the north.

Some of the passes I have mentioned, and especially the Sand Grat, the Kisten Grat, and the Segnes, are, I admit, only available for experienced pedestrians; I trust, however, that by this time the reader is satisfied that the Linth Thal is not such a dangerous trap as some people have imagined; and when he is reminded that it was by the Pragel, through the Sernft Thal, and over the Panix, that

Suwarrow led his army, partly at night, and continually harassed by the enemy, in his memorable retreat in the autumn of 1799, I hope he will not consider that in taking him to Stachelberg I have enticed him into a *cul de sac* from which all hope of retreat would be cut off, even if the overflowing of the waters, or an attack by *force majeure*, were to prevent his exit by the gently inclined plain through which the Linth and the Sernft discharge themselves into the lake of Wallenstadt.

When we arrived at the baths of Stachelberg, on the occasion already referred to, we found a considerable portion of the *grande salle*, into which we were ushered, cleared for action; and a wedding party, including the bride and bridegroom, were dancing away with great spirit. We explained to the landlord that we had not the honour to belong to the party (which he might have guessed, for certainly we were not in wedding garments), and also that we did not wish, in any way, to inconvenience the festive circle. But he reassured us at once by saying, "Danser et manger, manger et danser, l'un n'empêche pas l'autre;" and in a very few minutes our supper was brought to us in one part of the room, while the dancing and music went on in another, the actors in each performance devoting themselves to their respective parts so exclusively as to be almost unconscious of what the opposition was doing.

My first excursion from Stachelberg was, of course, to the Tödi, or Dödi-berg, the Monte Rosa of the Linth Thal; or rather, I ought to say, to the glacier of Sand, for the season was too far advanced to attempt to ascend the Tödi; besides which, having ascended the real Monte Rosa a short time before, I was not in the humour for a very hard day's work.

It took me an hour and a half to get to the Pantenbrücke, and two hours more to the lower Sand Alp, where there are some châlets, and where milk, butter, and curds may be obtained. One of the shepherds here is an obliging active lad; I did not take him with me on this occasion, but on a subsequent day he went with me to the Kistengrat, and I had every reason to be satisfied with him. Immediately below these châlets the Sand-bach is crossed, and you ascend by a steep zigzag path on the right bank until a small bridge is reached, when the path again crosses the stream, which makes here a fine fall of very considerable height, and in half an hour more you get to the Ober-stäffel or Obere Sand Alp, a little green plain about 6000 feet above the sea, at the very foot of the Tödi, amidst scenery of the greatest wildness. It is watered by the streams which flow from the glaciers of Sand, Spitzälpeli, Geisputzi, and Becki. These rivulets unite with the Röthe-bach and the Biferten-bach, near the foot of the Biferten glacier, and form the Sand-bach, which takes the name of Linth after its junction with the Limmern, a mile above the Pantenbrücke.

The châlets at the Obere Sand Alp are the last on the Glarus or north side; and I had intended getting one of the shepherds there to act as guide, but as I had been overtaken on the road by a chamois hunter, who was on his way to Dissentis, I preferred to place myself under his protection.

The path follows the stream for a little distance beyond the châlets, and then the glacier of Sand is crossed, rather in a south-westerly direction, bearing away towards the Catscharauls, a remarkable peak, 9340 feet high.

The view from the glacier, looking back towards the Sand-

bach, is singularly grand. To the left the lovely range of the Clariden, with the Geisputzistock, the Beckistock, and the Gemsistock standing out like advanced posts to protect its virgin snow from the daring tread of man; to the right the majestic Tödi; and in the back ground, the dark and inaccessible walls of the Selbsanft, crowned by a white fringe overhanging the glaciers of Platalva, combine to form a picture that it would not be easy to do justice to on canvass, and which, I fear, I have very inadequately described.

The highest point of the Sand Grat pass, between the Catscharauls and the Kleiner Tödi, is 9272 feet. The descent to Dissentis, by the Rosein or Rusein Alp, takes about three hours; and although it is rather steep in some places, it does not present any great difficulty. The view to the north is very extensive; but as it is much the same as from the Segnes, to which pass I hope the reader will accompany me, I shall not refer to it here.

From Kavrein, or Kaurein, the first châlets you reach on the Grisons, or south side, there is a pass into the Maderaner Thal, which must be well worth exploring.

The highest peak of the Tödi is not seen from near Dissentis, but only the southern point, called the Piz Rosein, by which name the entire mountain is known to the inhabitants of the Grisons. The northern peak, or Tödi proper, rises to a height of 11,883 feet out of a mass of glacier and snow, by which it is almost entirely surrounded. It is chiefly composed of stratified limestone, resting upon gneiss. At the base, near the Ober-Stäffel, is a kind of mamelon, to which the name of Röthe has been given; and beside it, from a glacier on the northern face of the Tödi, descends the Röthe-bach or red stream.

Here, as in many other parts of the canton of Glarus, a compact reddish argillaceous schist is found, which colours the water which passes over it. This may possibly have contributed to obtain for the Tödi its southern name of Piz Rosein, or pink mountain.

The Tödi has not been ascended more than three or four times, and the summit is always approached from the southward, the northern declivity being so steep that the snow can scarcely rest upon it.

Professor Ulrich, who made the ascent from the Sand Alp, went by a little lake, or tarn, on the Röthe, crossed the Röthe-bach, and proceeding nearly due east, passed under the Ochsenstock, hugged the eastern ridge of the mountain for some distance, and then descended on to the Biferten glacier, traversed some red snow, which, on the map he published of his route, he calls Schnee-Rosa*, and eventually went round by the glacier of Tödi, to the south of the summit, and got up, between it and the Piz Rosein.

Another route for attempting the ascent was suggested to me by a zealous chamois hunter, who was at the time inspector of forests in the valley of the Vorder Rhein, and whose acquaintance I made at Dissentis, and I have since heard that it has been adopted with success. This was to ascend from Dissentis by the glacier of Flems or Ilems, and the Stokgron; thence to cross the

* That curious phenomenon called red snow, as to the nature of which there has been so much learned controversy between the botanist, the chemist, and the zoologist, is now, I believe, almost universally admitted to be the *Protococcus nivalis*, a plant of the order of Algæ. Some persons, however, and amongst others Ehrenberg, still contend that it is more nearly allied to animal than to vegetable organisation, and give it the name of *Euglena sanguinea*.

western extremity of the Tödi glacier, and reach the highest peak by passing over the Piz Rosein. The last portion of the route is said to be intersected by wide crevasses, and might require the assistance of a ladder.

In returning from the Sand Alp to Stachelberg the route may be agreeably varied by ascending the Beckistock, and after passing over the shoulder of the Gemsistock, regaining the usual path a little below the Pantenbrücke.

Some of the most romantic scenery in Switzerland is to be found in the neighbourhood of the Pantenbrücke. I would advise all visitors to Stachelberg, who have a few hours to spare, to devote them to an expedition to this spot; and if they are able to scramble or wade some distance up the bed of the Limmern, they will see a gorge, hardly surpassed even by the Gasteren Thal.

The excursions round Stachelberg are adapted to the capacity of travellers of all kinds; and range from a promenade of two or three, to a day's work of ten or twelve hours, or even more. I will mention but one or two more, which I made myself, and which I thoroughly enjoyed.

One Sunday afternoon I followed the steep path that ascends immediately behind the baths, and passes close to the mineral spring; and in rather more than an hour I reached a large tract of gracefully undulated table-land, of exquisite verdure. It is irrigated by several streams, and prettily wooded, and is studded with a number of the real old-fashioned Swiss châlets, which are so pleasing when found in the right place, and with which the sight is offended only when they adorn such localities as Richmond Hill and Hampstead Heath. I found most of these châlets empty; nearly the entire population having gone down to

the church in the valley below. At length I saw an old man, upwards of eighty years of age, sitting, with a Bible in his hand, near the window of his habitation. He at once put down his book, asked if he could render me any service, and invited me to come in and visit his humble abode. Everything was of the simplest kind, but exceedingly clean and nice; the principal room had a slate table, and a stove in the centre, with some well-scrubbed deal benches round them. On each side was a recess containing a bed, covered with a thickly-quilted counterpane; and on the walls were hung some weapons for the chase, and some small coloured prints. In one corner of the room was a curious old chest, made of slate, let into wood *, which the old man told me had belonged to his great grandfather, and had been in his family one hundred and fifty years. In it he was in the habit of keeping his treasures, including the family Bible, which has been published more than a hundred years. On the slate that formed the top of the chest, he told me his children and grandchildren, as well as his father and grandfather, had learnt to write; but, in alluding to the rapid advances of the age, he said, with a sigh, but at the same time showing some feeling of pride at the idea, that his youngest grandchild, a pretty little girl about seven years old, whom I afterwards saw, insisted on learning to write on paper!

After some further conversation, I expressed a desire to leave, but he entreated me so earnestly to wait until his son and daughter-in-law returned, which he said they

* The slates came from the Blattenberg, in the Sernft Thal, a mountain which is said to contain some of the best slate in Europe for the purpose of writing. Slates are exported from the Sernft Thal to all parts of the world for the use of schools. Very interesting fossil shells are also found here in great quantities.

would do very shortly, that I could not resist complying with his wishes, especially as he told me that his sight had got so weak of late that he could hardly manage to read. I read him a couple of chapters out of his German Bible; and he was so grateful for what he called my kindness, that he made me write my name and the day of the month on the fly-leaf of his Bible. His gratitude was only exceeded by the amazement and delight of the rest of the family, when they came home and found me so employed. They insisted on my partaking of their frugal repast — cheese, brown bread, and raspberries; to which, out of compliment to me, they added some excellent cream and mountain honey. And when at length I left, the whole party, with the exception of the old man, who could not walk very far, accompanied me for some distance down the mountain, and on parting again thanked me. The little boy, into whose pocket I had dropped a small coin, after a look at his father, ran after me and returned it.

I descended to Rüti; and as I walked along the banks of the Linth, on my way back to the baths, and reflected on the gratitude shown by this family for what, at the most, was only a trifling piece of attention, I felt quite ashamed at the thought of how very little we do for the people of the country through which we travel, of how often we complain of the rapacity of the guides and the innkeepers, whom we ourselves have corrupted, and of how seldom we record the honest simplicity of the primitive inhabitant.

There were a great number of people assembled in the *grande salle* when I got back, as is generally the case at Stachelberg on a Sunday; and amongst them was the proprietor of a large cotton-mill at Rüti, which I had

observed on my way home. I got into conversation with him, and mentioned the pleasant walk I had had. He told me that if I had followed the path I had taken, beyond the châlets, in a north-westerly direction, I could have got over the ridge which separates the valley of the Linth from the Bisi Thal, and have got down to Eigen, and from thence to Muotta, in the Klönthal. Whilst we were talking, a woman came into the room and said that there was a mill on fire! The poor man rushed to the window, and exclaimed at once, "It is mine!" Such, unfortunately, was the fact; and shortly after, the church bell, which in this quiet and retired district, where neither religious nor political strife exists, summons the Roman Catholic as well as the Reformer to his devotions at different hours of the day, in the same village church, sent forth its melancholy peal to collect, indeed, both congregations, but for a far different object. It was now quite dark; and most interesting was it, as the sound of the bell reached each châlet, to see a light appear almost as if by magic, until the whole mountain before us was illuminated by the flitting lanterns of the peasants hurrying to assist in the preservation of the property of their fellow-citizen in the valley below. Of course a party of us went from the baths to render such assistance as was in our power. From the immense supply of water, and the number of hands that were got together in an incredibly small space of time, the fire was confined to one part of the building, and very little damage was done.

The next morning I ascended the Sassberg, a mountain, or rather a hill, for it is no great height, situated at the mouth of the Durna Thal, which commands one of the best general views of the Linth valley. It took me about

three hours to get to the top from the baths. The ascent is rather steep; but a great part of it may be done on a mule, and it is quite a lady's excursion. With a telescope I could trace the path into the Bisi Thal; it passes to the north of the Scheyenstock, a lofty peak rising immediately over Stachelberg, and does not appear difficult. From the Sassberg the Glärnisch is seen to the greatest advantage. The entire summit on the south-west side, which faced me, appears to be one mass of glaciers; and with the bold rocks and wooded heights in the foreground, it would make from this point a very striking picture. I had not much time, however, to contemplate it, as I was anxious to obtain a panoramic view of the Freiberg, or more correctly Freiberge, which is rather a district * than a single mountain; and, if possible, to get on to the glacier at the foot of the Hausstock, taking a glance on my way at the Richetli, a pass from the Durna Thal to the Sernft Thal, by which I contemplated reaching Elm in the course of the next two or three days.

I followed the crest I was on for some distance towards the Kärpfstock (9180 feet), which forms the southern boundary of the Freiberge, but I found that there was a valley between me and the Freiberg range, which I should not be able to cross; or which, at all events, even if I could get across it, would take me too much out of my line of march; so, leaving the Kärpfstock on my left, I descended rapidly into the Durna Thal by a savage gorge, down which rushes a mountain torrent, and got into the valley of the Durna, a little below the last châlets.

* The Freiberge extend from the Kärpfstock nearly to Schwanden, and include most of the highland that is encircled by the valleys of the Serfnt, the Durna, and the Linth.

As I have referred to the Freiberge, which are prominent objects from the road between Glarus and Stachelberg, and of which I afterwards had a good view in going over the Segnes, it may be as well here to state, that the Freiberge, or Free-mountains, form a well-known chamois preserve. I fancy, however, that the Glaronese, who from the earliest ages of their history have been famed for their sporting as well as their warlike propensities, do not now preserve as strictly as they used to do formerly. Unless the hunters of Glarus and the Grisons come to some resolution for the preservation of the game, by which they will all be bound, I greatly fear that in a few years the chamois will be as unknown in their mountains as the bouquetin, the race of which has there become almost, if not entirely, extinct.*

In proceeding to Elm by the Durna Thal, a path along the right bank of the stream is followed, a little beyond the last châlets. Here you ascend to the left, nearly due east, over an alp, until you reach the summit of the Richetli Pass, passing near a stone hut, built for the shepherds, but which I found deserted when I was there. The descent into the Sernft Thal is very easy; you soon see Elm, and you fall into the path that leads over the Panix, near Wichlen. I did not descend, as I wanted to return to Stachelberg; but I afterwards saw from Elm the other side of the pass, and I think that I may confidently say that no guide is required. It must take about seven or eight hours to get to Elm from the baths of Stachelberg.

On getting back to the Durna Thal from the Richetli, I

* In some parts of the Grisons, chamois are still seen in great numbers; some of the chamois hunters of the Engadin boast of having killed many hundreds! Between Coire and the Fermont, roe deer, and I am told also red deer, are found, but I believe that there are no bouquetins.

turned to the left, and went up the valley; and, crossing the stream immediately below the glacier, I ascended to the westward, up to a point from whence there is an excellent view of the Hausstock (10,363 feet), and of the glaciers between it and the Rüchi. From hence, I think, one might probably get to the Mutten See, and so return to Stachelberg by the Limmern Alp and the Pantenbrücke. This, if feasible, would make a beautiful excursion for any one wishing to see some of the finest parts of the Kistengrat Pass, without descending into the Grisons. As I had already been up the Kistengrat, I did not attempt it, and I regained the Durna, and followed its banks back to Stachelberg. On my return I found that the ladies I had accompanied over the Klausen wished to drive up the Sernft Thal, and they were good enough to offer to take me as far as Elm. I could not resist the invitation, and accordingly I gave up the idea of walking again over the Richetli.

We had a delightful drive, and from the rising ground just beyond Schwanden, enjoyed an exquisite view up the Linth Thal, with the setting sun shining upon the peak of the Tödi.

A very nice clean little inn has recently been built at Elm, and Jacob Elmer, the proprietor, is just what the head of such an establishment in such a place ought to be. He superintends everything himself, from the frying of your trout to the greasing of your boots, both of which are consequently well done; and when he has put things straight, he comes and relates to you all that has happened at Elm since he saw you last, which he is convinced he must have done some two or three years before. Of course it was some other traveller he saw, if, indeed, he

saw any, but that is very immaterial to you as well as to him.

As I intended going over the Segnes the next day, my first occupation was to get a guide. I was very anxious, if possible, to get down to the valley of the Tamina, or Calfeuser Thal, by the glacier of Sardona, which, I believe, no Englishman has ever yet done. I was told that there was only one man in Elm who would undertake to conduct a stranger over the Sardona glacier, of which the inhabitants appear to have a great fear. This was a certain Heinrich Elmer, a cousin of the host's and a well-known chamois hunter. We sallied forth accordingly in search of him, but although there were Elmers called by the name of every other saint in the calendar, no Heinrich was to be found. Unfortunately he was from home. I inquired of the landlord whether his family took their name from the village of Elm, or whether the village was called after the Elmers. He replied rather seriously, "The village has only been built three hundred years." I of course apologised; at the same time, without wishing to question the antiquity of the pedigree of the house of Elmer, I am very much inclined to think that Jacob Elmer merely means Jacob of Elm.

As no Henry of Elm was to be had, the host brought another of the clan for approval, and a more unsatisfactory-looking specimen could scarcely have been produced. My fair companions, who were just starting to return to Glarus, were, I think, rather alarmed at his appearance, and seemed to be making divers efforts, but in vain, to recall to their recollection any variety of the human race which the individual before them in the slightest degree resembled. He was not much above five feet in height, had

long arms, and short thick legs, terminated by feet somewhat of the size and shape of American snow-shoes. These he had encased in large worsted stockings, but, out of respect for the ladies, he had taken off his shoes before entering the room. He had very little neck, nature having kindly given his head, which was of rather large dimensions, the support of his shoulders. I afterwards ascertained that he possessed the power of speech; but, on this occasion, he only made use of some signs, by which he implied that he understood what we said to him, or at least so much of it as the landlord, who acted as interpreter, repeated. He shook his head in a most unmistakeable manner when the Sardona glacier was mentioned, but he was thoroughly acquainted with the Segnes Pass, *pure et simple*, and could find his way over it nearly as well by night as by day. As there was no one who would put a foot on the Sardona, it was very immaterial to me what guide I had as far as the top of the Segnes, where I intended to discharge him, and take a line of my own; so after bidding farewell to my host, and paying him his moderate bill, I started from Elm a little after three on a bright starlight morning, with the very promising companion I have described.

Shortly after leaving the village, we crossed the stream that descends from the snows of the Ofen, and ascended, for rather more than an hour, by a path along its right bank, until we got to another stream which comes from the Segnes, and joins the first nearly at right angles. Here we turned to the left, and followed the second stream for a short distance, and then proceeded almost due east, first over some pastures, and then over loose stones and rocks, until we had on our right, and very little above us, that

extraordinary hole or tunnel known as Martinsloch or Martin's hole, which had acted as a beacon almost from the time we quitted Elm.

Martinsloch, which Ebel imagines to be a corruption of *Martis* Loch, because the sun shines through it on the steeple of the church at Elm in the months of March and September, is a tunnel pierced through the ridge or screen which runs along the summit of the Segnes Pass, nearly under the Segnes Spitz (by Ebel also called the Tschinglen Spitz), a peak rising to a height of 800 or 900 feet above the ridge.

This tunnel appears to be quite round, and, as I was told, is about thirty feet in diameter. I tried in vain to arrive at a satisfactory conclusion as to its origin. There was no appearance of water near it; and, on the whole, I was inclined to think that portions of the rock, which is here stratified limestone lying horizontally, were detached by the shock of some of the numerous earthquakes which have visited this part of the country *, and that the cavity thus commenced was increased, and eventually rounded off, by the rotatory action of the sand, gravel, and snow which drift through it, occasionally with great force, and with a noise almost like thunder.

Martinsloch has, as may easily be imagined, been attributed to Satanic agency, and also to the miraculous interposition of Providence. My guide, who had nearly as much reverence for St. Martin as he had dread of the Sardona glacier, told me that the hole was made by the saint himself, in order to escape from the devil, who was pursuing him. This St. Martin was a most erratic saint; and he has given his

* Ebel mentions that there were thirty-three shocks in the course of the seventeenth century.

name to more than one rock and cavern in Switzerland and the Tyrol. On the occasion alluded to by the guide, I should fancy that he must have been on his way to the Calfeuser Thal, where he once took refuge, and where some châlets (for they scarcely deserve the name of a village) are called after him, and that he probably went by the Sardona glacier, as, with the facilities he appears to have had for fraying his way, he would hardly have submitted to the long detour which I was compelled to make.

Half an hour more took us to the top of the pass (8612 feet), making just four hours from Elm; and here I sat down to take a last look at the canton of Glarus. The whole Sernfthal lay before me, with Elm almost at my feet, backed by the Freiberge and the Glärnisch. To the right, I could trace, for some distance, the route to Weisstannen, by the Ramin; and to the left, the guide pointed out another pass from Elm into the Grisons, which goes near the Ofen, and considerably to the south-west of Martinsloch, and is, in fact, a continuation of the track we left, at the junction of the two streams I have referred to.

On the south side of the Segnes Pass, there is a very peculiar glacier. It has no crevasses, and its surface is nearly level. It inclines from west to east, and also slightly from north to south. It does not descend into the valley, like the greater glaciers of the Alps, nor does it exactly resemble the glaciers that are found on the table-land, near the summits of high mountains, as on the Glärnisch, the Diablerets, the Wildstrubel, and the Buet. It is chiefly composed of névé, but on going to the lower end of it, I found solid ice at a certain depth. It fills a basin, or *cirque*, of considerable size, which is entirely surrounded by precipitous rocks, except on the south side,

where it terminates on some low mossy ground, called Sandsboden; from whence a stream flows down to Flims, in the valley of the Vorder Rhein. It reminded me rather of some of the frozen lakes in the Pyrenees, than of any other glacier I remember having seen in Switzerland.

On to this glacier, called in the neighbourhood Flimser Firn, we descended from the summit of the pass, over some loose grauwacke and shaly slate. There is no path, and the way is steep; but there is good footing, and one might easily descend anywhere, up to the point where the limestone begins, which is a little to the north of Martinsloch.

We passed immediately beneath this singular hole, then crossed the glacier diagonally towards the south-east, and got on to the Sandsboden just below the Trinserhorn, the southern buttress of the range that separates the Flimser Firn from the glacier of Sardona.

Here my companion and myself did ample justice to the Roussillon and cold mutton, which the worthy host at Elm had provided for us; and I made a rough sketch of Martinsloch and of the Segnes Pass, which the morning sun was just beginning to reach. It had long since tinted the snow-clad summits of the Silberspitz, and the Vorab, or Piz Mor, a peak of 9960 feet, to the south-west of the pass.

Before parting with my guide, I made him show me the way down to Flims. He seemed, however, to have a suspicion that I intended going on the Sardona glacier, for he would not leave me, until I had written, in pencil, on a slip of paper, that he had done all he had undertaken to do, that I was satisfied with him, and that he had left me on the direct road to Flims.

The poor fellow shook hands with me, and wished me a "Glückliche Reise," and in a few minutes he disappeared behind a rock.

I now retraced my steps, and crossed a part of the Sandsboden, going to the north-east. There was an immense field of snow before me, bounded by the Trinserhorn, and the Sardona (also called the Saurenstock) to the left, and by the Ringelkopf, or Ringelspitz, to the right. Beyond the snow, immediately in front of me, there was only the deep blue sky.

I was not at all desirous of doing anything foolhardy, and I had long given up all idea of attempting, by myself, to get down from the Sardona glacier into the Calfeuser Thal; but the weather was so magnificent—frosty, with a bright sunshine—the snow was in such excellent order, hard and crisp, yet just giving way enough to afford a firm footing, and I myself was in such good wind and spirits, that I thought I should be unworthy of enjoying a walk again, if I did not cross at least a portion of the glacier, and in some degree survey the part I could not get over. I was too old a traveller, however, not to secure a safe retreat, in the event of the mid-day sun melting the snow to such an extent as to render it dangerous; so I did not venture on the glacier until I had ascertained that, in case of emergency, I could get back along the edge under the Ringelkopf. Having thus made Flims my base of operations, I walked with a light heart and at a rapid pace over the frozen snow; I say frozen snow, as I could hardly see where the glacier began, or how much of the snow, which had recently fallen in great quantities, had ice under it.

The Sardona has an elongated summit, covered with

snow, somewhat like the Clariden, and extending towards the Scheibe. I was very much surprised, on looking at Ziegler, to find that neither the Scheibe nor the Sardona is as high as the Ringelkopf, on which I could see scarcely any appearance of snow.* However, the existence of snow on a mountain, up to a certain height, depends nearly as much on its shape and position as on its elevation.

If the Sardona can be ascended, which I should think it might be on the west side, from the Segnes Pass, the view from the summit looking down the Calfeuser Thal, with the Calandaberg in the distance, would be splendid.

There was a melancholy kind of pleasure in finding one's self entirely alone, amidst scenes of such wild grandeur; no sound to be heard, no living animal to catch the eye, hardly a vestige of vegetation within sight. I could have stayed there for hours, but the snow was melting fast, and the glare of the sun was beginning to affect my eyes; so I felt that it would be imprudent to remain longer, and I returned, reluctantly, towards the Sandsboden.

I went over the shoulder of the Flimser-stein, from which I had a glorious view of the Tödi, the Hausstock, the Bifertenstock (10,779 feet), on this side called Durgin, and of the entire range of the high Alps of the Grisons between the Splügen and the St. Gothard. The magnificent glacier of the Hinter Rhein, backed by the Piz Valrhein and the Möschelhorn, both nearly 11,000 feet high, were directly before me; and a little more to the left, the Schwarzhorn, which separates the Splügen from

* The Sardona, according to Ziegler, is 10,222 feet, the Scheibe 9631, and the Ringelkopf 10,669. [The Ringelkopf spoken of by Ziegler is perhaps the peak bearing that name on the maps of Weiss and Gross, lying north of Trins, and some miles east of the Segnes Pass.—EDITOR.]

the St. Bernardin, raised its lofty peak. The St. Peter's Thal and the Savien Thal, two as interesting valleys as any in this part of Switzerland, but very little known to the majority of travellers, stood out at right angles to the Vorder Rhein, into which they discharge the rivers they bring down from the snowy range to the south.

The Vorder Rhein was just below me; that I soon reached, and a walk of two hours, chiefly along its banks, brought me to the "Adler," at Reichenau, where my old friend, the landlord, received me with his usual hospitality, and placed at my disposal the best of everything that his hotel possessed.

Reichenau, in addition to its fine situation at the confluence of the Hinter and Vorder Rhein, will always have a peculiar attraction from its having been the spot where the Duke of Orleans, afterwards King Louis Philippe, acted as usher of a school. His room, neatly but plainly furnished, is in much the same state as it was at the time he occupied it, except that on the walls hang two pictures of Louis Philippe by Winterhalter, one as Duke of Orleans at the age of eighteen, walking into Reichenau, and the other on the throne as King of the French, and both presented by him to Mr. Planta, the worthy owner of the house. One day when I happened to be there, a young man visited this room, and appeared to feel more than ordinary emotion at seeing it. He wrote in the stranger's book, "Louis Philippe d'Orleans," — it was the Comte de Paris, the grandson of its former occupant! On the table lay a pen, tied round with a piece of black crape. With this pen King Louis Philippe had signed his last will a few days before his death. It had been sent to Mr. Planta, as a souvenir, by Queen Amélie.

I started, long before sunrise, from Reichenau, in order to explore the Calfeuser Thal, which, as I have shown, I was compelled ingloriously to ascend from the lower end. I had on a former occasion been from Reichenau to Ragatz, by the pass of Kunkels, so I lost no time in following the same track to Vättis, a village which stands at the mouth of the Calfeuser valley.

The Calfeuser Thal, in some of the maps spelt Kalfeusen, is one of the most striking valleys in Europe. It is difficult, of course, where there is so much that is fine, to single out one or two particular places as surpassing all others. But if I were called on to name the two valleys which have made the greatest impression on me—and in the course of my wanderings I have seen a good many—I should fix on the Val Anzasca and the Calfeuser Thal. I hardly know which to admire most: the gorgeous sublimity of the one, or the savage grandeur of the other. Near Vättis I found some cowherds, who were going up to the head of the valley to bring home their cattle from their summer pastures; and a fine independent set of fellows they were. I was very glad to have the benefit of their company, and they were well-bred enough to say that the advantage was mutual; so on we journeyed together. They went at an awful rate;—there is a tolerable mule-path to St. Martin, but they took every short cut, regardless of rocks, water, or any other impediments. For three hours we walked almost without intermission, first winding our way through a primeval pine forest, which no rays of the sun could penetrate, then climbing over a cliff that was all but perpendicular, then fording a stream, and then again diving into the thick woods.

At times the gorge was so contracted, that there

appeared to be hardly space to pass between the chasm, through which rushed the Tamina in her headlong course, and the precipitous rocks that, on either side, closed in the valley above. Then it again became wider, and we could see the dark outline of the Graue Hörner, on our right, or the snow-tipped summit of the Ringelspitz on our left; then it again contracted, and all further progress appeared to be barred; when, suddenly, the Sardona and the Scheibe stood before me in all their glory! Spread out below them was the much-dreaded glacier I had been so anxious to descend, and from which the Tamina is fed.

Here the main object of my walk was gained; so I bade adieu to my companions, who were anxious to get on, and I lay down on the ground and thoroughly revelled in the scene around me. A shepherd brought me some cheese and brown bread, and some delicious milk, the most refreshing of all beverages on such occasions; and, after having surveyed every point over and over again, including the path from Weisstannen that descends a little above St. Martin, I believe that I fell asleep, for on looking at my watch, I found that I had been there nearly two hours, and on getting up I felt rather stiff, which, considering the heat I was in when I lay down, was hardly to be wondered at.

The Calfeuser Thal lies east and west, and is quite shut in by almost inaccessible mountains, except at the east or lower end, where the valley which descends from Kunkels meets it nearly at right angles, and separates it from the Calanda-berg. St. Martin is the only village in it, if indeed it can be called a village; some new châlets, however, have lately been built, where I dare say one might put up for a night.

I descended the valley to Vättis, at a more moderate pace than I had ascended it; and it appeared to have all the freshness of new ground. The Calanda, or Galanda, an immense mass of stratified limestone, of so light a colour as almost to resemble dolomite, rising to an height of 9226 feet, and on this side almost perpendicular, is the prominent object before you until you have passed Vättis. There is a very fine view from the Calanda of the mountains of the Grisons, on the east side of the Rhine; and it makes a very pleasant excursion to ascend it from Ragatz, descending near Untervatz, opposite Chur.

From Vättis to the baths of Pfäffers, you still continue to follow the banks of the Tamina. Pfäffers is so well known that it needs no description here. I will only observe, that it is very difficult to discover the path leading down to the baths from the road you pursue from Vättis; and it may be worth while to take a boy from the slate quarry, as you pass, to show it to you. It has happened to me, twice, to miss this path, and to have to retrace my steps, which, at the end of a day's march, is never pleasant.

From Pfäffers, I again walked along by the side of my friend the Tamina, whom I had accompanied that day very nearly from her source to her mouth, and reached Ragatz; and I was not at all sorry when I found myself in comfortable quarters at the Hof.

I must now conclude a description, which, from the loss of some of my notes, and from other circumstances over which I had no control, is far from complete; but if it be the means of inducing a few energetic pedestrians to visit the magnificent scenes that I have attempted to describe, and to give an account of their performances, filling up the many blanks which I have left, I shall feel that I have not

entirely written in vain. If they will allow me to suggest a route, I should be inclined to recommend them to go from east to west. Assuming that they start from Ragatz, or from Reichenau, they should go to Vättis, and there get as guide a chamois hunter who is thoroughly acquainted with the country, and sleep the first night at St. Martin. The second day will be well employed in crossing the glacier of Sardona, descending to Elm by the Segnes; and the third, in getting to Ruvis or Brigels, in the valley of the Vorder Rhein, by the Panix. The next day they may go over the Kisten Grat to Stachelberg, where a couple of days' rest will do them no harm, during which they may drive down to the town of Glarus, and pay a visit to the Klönthal. From Stachelberg to Amstäg, by the Sand Grat and the Kersteln Thal, will be a glorious termination of such a week's walk as few people have been fortunate enough to enjoy;—or, if they are more ambitious still, they may go up the Tödi, from the Sand Alp, descend to Trons or Dissentis, by the Stokgron*, and reach Amstäg the next day, by the Maderaner Thal; and were I to express a wish, it would be, that I may be one of the party.

R. W. E. FORSTER.

* A doubt has recently been raised as to whether the Piz Rosein is not higher than the northern peak of the Tödi. They might settle this point.

NOTE BY THE EDITOR.

I take this opportunity to direct the attention of lovers of grand scenery to the Biferten glacier and the range that encloses it to the east and south. So far as I know, it has never been thoroughly explored; but a view obtained from a point rather high up on the north-eastern side of the Tödi leads me to think that the scenery on that side is far superior in savage grandeur to that of the pass of the Sand Grat. Sleeping at the lower Sand Alp, a party provided with ropes and ice-axes might attempt a passage to Trons in the valley of the Vorder Rhein, and in case of failure could return to the same night-quarters on the second evening."

In warm weather, when the glacier streams are full, the waterfall below the Upper Sand Alp is one of the finest in Switzerland, but there is no favourable point of view on the side by which the path is carried. It is necessary to approach it along the northern bank of the stream.

The upper end of the Linth Thal is rather rich in plants. A rare species, *Rumex nivalis* (Hegets.), is not unfrequent at about 7000 feet above the sea.

CHAP. XVI.

THE OLD GLACIERS OF SWITZERLAND AND NORTH WALES.

In the good old days of pigtails and bagwigs the tourist world cared nothing for glaciers, and only a few philosophers, like De Saussure, ever dared voluntarily to face the privations and dangers of the High Alps; their effigies in many an engraving in something very like full court costume, with a crowd of attendant guides, still bearing witness to the interest they took in the history of Alpine glaciers. But now tourists by the thousand annually overrun Switzerland, and since Agassiz and Forbes commenced their work, many, in a simple unostentatious manner, perform feats of Alpine daring such as even De Saussure scarcely dreamed of, and thus satisfy their souls with ice. The subject has many bearings, and in this chapter I propose to confine myself to some remarks upon the history and antiquities of the glacier world.

It is now twenty years since Agassiz and Buckland announced that the valleys of the Highlands and of Wales had once been filled with glaciers. Few but geologists heard the announcement, and, with rare exceptions, those who cared at all about it met the glacial theory of the Drift in general, and that of extinct glaciers in particular, with incredulity, and sometimes with derision. Rash writers still held that the far-borne boulder drift, so widely spread

over the cold and temperate regions of Europe, Asia, and America, had been scattered abroad by mighty sea waves, set in motion by the sudden upheaval of hypothetical northern continents; and the polish and striation of the rocks in the mountain valleys, — the veritable signs of vanished glaciers, — were attributed by flippant writers and talkers to cart-wheels, hob-nailed boots, and the nether integuments of Welshmen sliding down the hills; as if the country had been inhabited by a monstrous race of primitive Celts — all clad in the famous armour of stone worn by Loupgarou and his giants, when they fought with the heroic Pantagruel — their sole occupation for illimitable ages having consisted in the performance of Titanic *glissades* upon the rocks. But now the tide has changed, and for years the glacial theory (applied to a late Tertiary epoch in Britain and elsewhere) has not only steadily gained ground among geologists, but has even found its way into the writings of more popular authors. I now purpose to show briefly, as far as my data will permit, the relation of these extinct glaciers to those of Switzerland, and of both with the erratic Drift that often covers the lowlands.

PART I.—SWITZERLAND.

EVERYONE familiar with the Alps is aware of fluctuations in the dimensions of the glaciers. It is recorded in the pages of Forbes, that since the year 1767 the glacier of La Brenva rose 300 feet above its present level and again declined, and the terminal moraines of the Rhone glacier, arranged concentrically one within another, bear witness to its recent gradual diminution. The great Gorner Glacier of Monte Rosa, also, is even now steadily advancing, and

is said, within the memory of men not old, to have already swallowed up forty châlets and a considerable tract of meadow land.

But all such historical variations in the magnitude of glaciers are trifling compared with their wonderful extension in pre-historic periods. There is perhaps scarcely a valley in the High Alps in which the traveller, whose eye is educated in glacial phenomena, will not discern symptoms of the former presence of glaciers where none now exist; and in numerous instances, far from requiring to be searched for, these indications force themselves on the attention by signs as strong as if the glacier had disappeared but a short time before the growth of the living vegetation. So startling, indeed, are these revelations that for a time the observer scarcely dares to admit to himself the justness of his conclusions, when he finds in striations, moraines, *roches moutonnées*, and *blocs perchés*, unequivocal marks of the former extension of an existing glacier, more than a long day's march beyond its present termination; and further, that its actual surface of to-day is a thousand feet and more beneath its ancient level. I know of no glacier to which such remarks are not applicable, and to none more so than the familiar examples of the upper and lower glaciers of the Aar, which accordingly I select as examples.

The rounded forms of the rocks and the striations on their surfaces produced by the flowing of glaciers over them, are familiar to all. The original asperities are by this process worn off, and, as is well known, the whole assumes a largely mammillated appearance; the surfaces being polished, grooved, and striated by the imprisoned stones and finer débris that lie between the solid weight of

slowly progressing ice, and the rocky floor over which it passes. Let any one in going up the lower glacier of the Aar, attentively consider the mountains on either side, and he will observe the signs of glacial action somewhat above the present surface of the ice, as for instance, in the neighbourhood of the Pavilion of M. Dolfuss-Ausset on the left bank. Becoming accustomed to such indications, if he cast his eye further up the slopes, he will observe the same rounded and striated contours stretching far up the mountains to a height of more than a thousand feet, plainly marking both the breadth and height of the glacier at earlier periods of its history; while far in the upper regions, the serrated and weather-worn crags, that form the lips of the valley, now almost bare of snow, still define the upward limits, where the solid flowing ice in old times ceased to grind the rocks. It is certain that all glaciers must deepen their beds by erosion, and it may be, that when a glacier filled a valley to the bases of the serrated ridges, the thickness of the ice was not equal to its present mass, added to the superincumbent weight indicated by the signs mentioned above. There is, nevertheless, reason to believe that the glacier was once far thicker than at present: and this is further attested by numerous proofs of its original great longitudinal extension, the length of a glacier being generally more or less commensurate with its mass.

In 1852 I ascended the Ober Aar glacier with M. Daniel Dolfuss-Ausset.* There also it is equally plain that

* We left the Pavilion of M. Dolfuss-Ausset about two o'clock, and leisurely descending the lower glacier of the Aar, we turned to the right, and, gradually ascending, skirted along the hills till we reached the neigh-

the ice formerly reached far higher up the sides of the mountains than at present. Several tributary glaciers help to swell the main mass. Some directly join it, while others terminate on the upper slopes, and melting or breaking off in avalanches, discharge part of their moraines over the intervening cliffs. But judging by still existing signs of mammillation and striation, the day was, when the minor valleys, now occupied by these tributary glaciers, were overridden by the great original glacier that once filled the valley almost to its brim; when all the main groovings were formed in the direction of the flow of the great river of ice, that passed steadily on unchecked by minor obstructions. When, at a later period the climate ameliorated, and the glaciers declined in size, then in the channels of the minor tributary glaciers striations were formed, and are still forming, transverse to those produced before the decrease of the original glacier. As it is with

hourhood of the upper glacier about half-past six. M. Dolfuss-Ausset had four assistants with him, and I had a guide from the Grimsel. We slept in a small stone hut, used for cattle, near the end of the glacier. A slab of stone at the door served for a table, and with the help of a stove, and the provender carried by M. Dolfuss-Ausset's people, we made ourselves remarkably comfortable. Two things specially struck me. One of these was, that seen from this elevation, the planets seemed to *swim* in space. Another impressive circumstance was the utter stillness, when the night's frost (though in August) had arrested all the smaller brooks.

At four A.M. next morning, M. Dolfuss-Ausset aroused us all with a blast on his horn, and by half-past five, after a luxurious breakfast of coffee and cold meat, we were all a-foot. As far as I recollect, we reached the top of the glacier about eleven, having seen three chamois in the early morning. It was easy of ascent. The average slope is gentle, and there were no important crevasses. At the top flowers were blooming on the bounding rocks; but I omitted to take specimens by which to record their names. The view of the broad snow fields between the snowshed and the base of the Finster-Aar-Horn, is never to be forgotten. In the afternoon we descended the glacier, and crossing the shoulder of the Siedelhorn, we reached the Hotel of the Grimsel about 7 o'clock.

the glaciers of the Aar, so is it with many other Alpine glaciers, and so has it been in North Wales.

At the upper end of the Ober Aar glacier, where the snow-shed slopes on one side to the Aar, and on the other towards the glacier of Viesch, the inclination is gentle, but on either hand craggy peaks of gneissic rocks rise boldly above the ice, so steep, that in summer the snow only lies on them in patches. On the sides of the crevasses that are found almost up to the snow-shed, it is easy to observe that *stratified* glacier ice has been formed, for the ice never having been subject to any but a vertical pressure, the veined structure, now so well explained by Dr. Tyndall, is necessarily absent. But the form of the bounding peaks tells that the snow and ice lie thick, though of unknown depth, and were the covering removed, there is no reason to doubt that the rocky floor underneath would, at the water-shed, present striations sloping both down the valley of the Aar and towards the Viesch glacier.

At the lower end of both the Aar glaciers, the terminal moraines are comparatively small, for in the greater part of these mounds as fast as matter is supplied, it is attacked by the streams, that, flowing from the glaciers, speedily remove the smaller débris. Considering the great size of many of the blocks that lie on the surface of the ice, one is often surprised how comparatively rare is the occurrence of such masses on the terminal moraines; but this surprise ceases when we consider that in their slow downward progress, these blocks are constantly split at the joints and other crevices, and are thus gradually reduced by winter frosts, so that comparatively few reach the terminal moraine in their integrity. When they do get so far, they are then still subject to the same influence, till in

time, many of them get so broken, that they also find their way to lower levels by the power of running water. In old glacier countries, where glaciers are now no more, the observer is often struck with the scarcity of moraines in positions where he might expect to find them; but his surprise ceases when he is aware of the facility with which the moraines of even large glaciers are often wasted as fast as they are formed; and if these existing glaciers disappeared, their moraines would in many cases be soon utterly obliterated.

Below the Lower glacier of the Aar, the stream winds through one of those gravelly flats, so frequent in old glacier valleys, and at its lower end, where this plain narrows towards the road that turns up towards the Grimsel, a boss of granitic gneiss, well *moutonnée*, nearly bars the valleys across which the path leads. It is partly covered by striations, well marked on the slope that looks up the valley, telling the observer, not only of the previous extension of the glacier thus far, but also that the ice which filled the plain pressed strongly on the higher side of the boss, and was forced upwards till it fairly slid over the rock, the lower stratum of ice being quite unchecked by the opposing bar. I mention this especially, because similar phenomena were long since pointed out by Buckland in describing the old glaciers of North Wales. On either hand, all the way from the glacier to this point, the mountain sides show the same mammillated contours that mark the rock above the ice, and a little farther down the valley, the signs of glacial action become even unusually obtrusive. A large hill rises from the valley on the right, up which the road winds to the Hospice of the Grimsel. On the left is the narrow gorge of the Aar, and on the

other side of the hill, the sullen lake of the Grimsel half encircles it far above the level of the river. At its outflow the lake is partly dammed up by a little moraine-like débris; but it requires no soundings to tell that the rounded rocks close by, passing under the rubbish, form the chief retaining barrier of the water. On both banks of the lake, except when weatherworn, the rocks are ice-worn, and it is nearly looped into two by *roches moutonnées*, that project from either bank toward the centre, like Llyn Idwal above Nant Francon, and the lakes of Llanberis, if these were undivided by the alluvial strip below Dol-badarn Tower. At its farther end a long, narrow, high, rounded barrier of solid rock (over which the glacier formerly poured) crosses the valley, damming up the lake in that direction; and here so great has been the pressure, that I found proof of the ice having been forced into a narrow transverse fissure, which it polished and striated quite out of the direction of its general flow. The lake lies in a complete rock basin, similar to some of the tarns of North Wales, and such as I only know in regions where glaciers once have been.

On the hill that rises behind the Hospice, the glacial striations on the rocks gradually circle round to the further end of the lake, following the sweep of the valley; and it soon becomes apparent, that this hill itself is but a gigantic *roche moutonnée*, mammillated and striated all over, on which erratic blocks were left by the decrease of the glacier of the Aar, after a period in which it rose so high, that it not only filled the hollow of the lake, and pressed upward over the ridgy barrier at its further end, but actually overflowed the entire hill.

If from its polished side you survey the opposite ridge

of the Aar valley, the vast size of the old glacier becomes still more strongly impressed on the mind. A great wall of rock rises sharply above the river course, and on its side the striations which cover it have been deflected upwards at a low angle, the effect of the intense jamming to which the thick ice was subjected in its downward course, when obstructed by the great *roche moutonnée*, that rises in the middle of the valley between the lake and the mountains on the opposite side of the Aar. Above this wall the mountain is still *moutonnée* almost to the very summit, where at length the serrated peaks of the highest ridge rise sharply above the ice-worn surfaces.

The valley has been filled with ice almost to the very brim.

But the proofs of this great fact are not yet exhausted. In descending from the upper Aar glacier, I crossed, with M. Dolfuss-Ausset, that part of the Siedelhorn that overlooks the Grimsel, and then saw that the mountain was covered by similar indications of the former extension of glaciers; and, in 1858, in crossing the Grimsel Pass to the valley of the Rhone, I observed in the ascent that the old glacial striations *circle round* the sides of the amphitheatre of mountains that overlook the lake, indicating the grating of the glacier when the vast hollow was filled with ice. I then, led by old experience both in Switzerland and Wales, ventured to predict to my companion, Dr. Tyndall, that when we reached the summit we should find the striations change their direction, and pass *across* the watershed. This proved to be the case, leading to what I conceive to be a conclusion no less startling than sure, that this immense glacier here overflowed the ridge, and sent off a branch in the direction of the valley of the

Rhone, just as at the present day the great Aletsch Glacier overflows its bank at the side valley of the Märjelen See, where an offshoot of ice, more than 100 feet thick, now terminates in the lake, but in olden times flowed far beyond its present bed to join the Viesch Glacier on the east side of the Æggisch-horn. Similar signs are equally strong on the hills on the S.W. side of the Betten Horn, where, after a solitary ramble on the lower part of the Aletsch Glacier, I climbed the ridge, and observed that on the watershed the striations turn and run transversely to the direction of the Aletsch valley, crossing the ridge towards the valley of the Rhone, thus indicating that the Aletsch glacier there also overflowed its channel, sending the surplus ice into the neighbouring valley.

I find my note-book well charged with descriptions of the ancient extension of the glacier between the Grimsel and Meyringen.* Everywhere the signs are strikingly apparent, both below and far up on the mountain sides; but the details would scarcely add force to the foregoing observations; and to avoid repetition I willingly omit all but one description. A little above Meyringen the Aar flows through a long, deep, and perfectly precipitous gorge, or passage which the river has cut for itself in the limestone rock of the Kirchet. Looking down the cliffs, you see occasional pot-holes at various depths, formed by the gyration of stones, and marking the different levels of the water during the excavation of the ravine. Above, on either side, the rock is all *moutonnée*, the striations running *westerly*, in the direction of the valley; and the surfaces are more or less strewn

* See also a memoir by Mr. Charles Maclaren.

with moraine matter and huge erratic blocks of gneiss, syenitic-looking fragments, and other rocks that have travelled on the old glacier from the further recesses of the

ROCHES MOUTONNÉES BY THE GORGE OF THE AAR.

Oberland. Beyond the eastern entrance of the gorge, towards the opening of the Gadmen Thal, the mountains on either side of the Aar have been smoothed by ice far above the level of the river; and angular and waterworn gravel, and syenitic blocks, lie on the eroded surfaces. A great alluvial plain, through which the river wanders, lies east of the Kirchet; and, but for this deep gorge cutting through the hill, the river would be dammed up, and the plain would form a long deep lake. In

GLACIER OF THE AAR FILLING THE HOLLOW BEYOND THE KIRCHET.

like manner, when the glacier overflowed the limestone rocks that bound the gorge, and formed the *roches moutonnées*, there must have been a long, broad, and deep lake of ice filling the valley of the plain to a height

greater than the summit of the Kirchet, and pushing against and over that barrier of rock. As the glacier decreased, and no longer overflowed the rocks, it would for a time still abut on the eastern side of the barrier. Finally, when it still further declined in size, the hollow of the plain (at present covered with alluvial débris) then became filled with water, and formed a lake somewhat of the nature of the Märjelen See, but on a larger scale.*

THE PLAIN ABOVE THE KIRCHET LAKE, WITH ICEBERGS.

Thus it would remain till the running water by degrees cut for itself a channel as deep as the bottom of the lake, then partly filled with mud and other ice-drifted deposits. I was long much puzzled by the stratified and *drift-like* appearance of some of the débris (including boulders) on the lower sides of the hills that bound the plain, till it occurred to me that the conditions mentioned above might explain this circumstance; for, just as the bergs that break off from the Aletsch glacier scatter blocks and smaller gravel amid the finer mud that sinks in the Märjelen See, forming true boulder strata there, so in the case of the old lake above Meyringen, at a time when the Aar glacier entered it, icebergs laden with moraine matter must have floated in the water, and discharged their freights wherever they chanced to roll over or to melt.

* The former existence of a lake here has been inferred by previous writers.

It would be easy to show proofs of the greater extension of this glacier below Meyringen, where there still remain ample signs of glacial action. Its mass was then swelled by other tributary streams of ice, one of which flowed down the Gadmen Thal; and I am inclined to suspect it might be shown that at one time the glacier was so large, that on the Meyringen side of the watershed of the Pass of the Brunig, it ran into the tributary valley that leads to the Pass, and perhaps even overflowed its summit and descended to the Lungern lake and beyond the Sarnensee. For, between that lake and the watershed, there are many scattered blocks of gneiss, which, if maps may be trusted, must have passed down the Aar valley to find their way across the Pass, seeing that there are no direct channels leading up to the gneissic mountains on the south, through which glaciers might have conducted the blocks into the Jurassic and cretaceous valley of Lungern. The only possible route seems to have been the circuitous one by the Aar valley and so over the Pass of the Brunig.

Such are a few of the more striking phenomena connected with the glacial history of the valley of the Aar, and similar observations might be extended to that of the Rhone and to many other Alpine valleys. The largest of existing glaciers is but of pigmy size when compared with its predecessors. But great as they were they had their traceable limits, even if, like Arctic glaciers, they held on till they reached the sea. It has been ably argued by Playfair, Charpentier, and Forbes, that on the north this limit was the range of the Jura; or, in other words, that the ice overspread the vast expanse of undulating ground

that lies between the Oberland and the Jura, against which the glaciers were arrested in their course, and there deposited as moraine, about 500 feet above the Lake of Neufchatel, those celebrated blocks of which the Pierre à Bot is the most conspicuous. The blocks of Monthey also, on the mountain opposite Bex, in the valley of the Rhone, are supposed to have had a like origin.

I think there are grounds why this mode of accounting for the position of these blocks both on the Jura and above Monthey should not be received*, for the simple reason, that, if it be true, the country between the Jura and the Oberland ought to show numerous traces of moraine matter, arranged somewhat in the ordinary manner in which it now occurs, in connection with existing or ancient glaciers, only on a grander scale. But the loose detrital matter that in a great measure covers the country, though of the same general material, is very different in its arrangement from that of moraine débris. Wherever I have seen it, it may be described as resembling in all its essential characters the marine boulder-clays of other glacial Drifts, as these strata occur in Europe and in North America; and it is perfectly comparable to some of the boulder drifts of Britain, which were accumulated at a time when the glaciers of the Highlands and of Wales descended to the level of the sea.

Between Schaffhausen, Zurich, Zug, and Lucerne, the country is more or less strewn with gravel derived from the waste of the Alps. This gravel is distinctly *stratified*, (being sometimes interbedded with sand

* Unless possibly it may be argued that they were carried to the Jura by glaciers of older date than the Newer Pliocene Drift.

and clay,) and consists chiefly of water-worn stones mixed with angular and subangular fragments and blocks of all sizes up to several yards in diameter. Many of the stones and blocks are striated or scratched in a manner similar to those found in glacier moraines, and equally resembling those found in the stratified gravels and boulder clays of the northern plains of Germany, North America, the Lowlands of Scotland, the Midland Counties, Anglesey, and South Wales. On the road between Horgen on the Lake of Zurich, and Zug, boulders and stratified gravel are common, and on the Zug side of the watershed, great mounds of drift are of frequent occurrence; not arranged symmetrically like moraines, but rather resembling many mounds in the lowlands of Scotland, which are chiefly the result of a partial denudation by atmospheric agencies of part of the Drift that originally covered the country.

On the north bank also of the Lake of Geneva, far above the lake, in the railway-cuttings and elsewhere, the superficial detritus has even a more typical drift-like character, being composed of well stratified gravel, sand, and clay, charged with boulders of gneiss, granitic rocks, limestone, &c. This gravel is composed mostly of water-worn fragments, the boulders being both rounded and angular, and some of them showing scratches and striations like those produced by the action of ice. The railway station at Geneva, stands above clay well charged with boulders.

On the hills that bound the valley of the Rhone, east of the Lake of Geneva, opposite Bex, lie the celebrated blocks of Monthey, so well described by Professor Forbes, who considers them to have been deposited from the surface

of a great glacier that once filled the valley. A mountain torrent passes close to Monthey on the south, and in a deep natural cutting, forming the bank of the stream by a mill, the superficial stony detritus is rudely stratified, just like many an ordinary section in British Drift. It is full of large boulders of gneiss, granite, sandstone, &c., and from the quantity of fragments of limestone it contains, the gravel is partly consolidated, through the agency of infiltrated carbonated water carrying away and re-depositing calcareous matter among the fragments. Between this point and the blocks of Monthey small boulders are of frequent occurrence. The larger ones lie on both sides of the torrent, mostly at greater elevations than the section by the mill, while those of greatest size are scattered chiefly among the vineyards and beautiful groves that lie above the town, near the winding road that ascends the mountain. I wandered among them half a long summer's day, pleased and amazed by their beauty and great size, and the evidence of power conveyed to the mind while reflecting on the agency that bore these ponderous masses so far from the parent rocks, and left them perched on this hill, from 500 to 600 feet above the Rhone. All those of largest size that I saw are of granite, and the most massive of all, lying in a vineyard, I measured. It is twenty-two paces in length, and nearly equally broad and high, and probably contains between 8000 and 9000 tons of rock. On its flat summit there is a good sized summer-house, with a small garden containing cherry trees, reached by a flight of steps. Others of smaller dimensions are formed of gneiss, and some of sandstone. They are now being ruthlessly quarried for building stone, for a bridge across the Rhone;

but so profusely are they scattered all along the hill, that it will take no ordinary amount of blasting sensibly to diminish their numbers.

Several fresh cuttings had been made close to the road; and where the blocks do not rest directly on the shale that forms the hill, *they lie on and in* a sandy gravel roughly stratified, the material of which consists of fragments of granite, gneiss, limestone, and sandstone, generally well water-worn, a large proportion of the pebbles being quite rounded by ebrasion like pebbles on the shore. This gravel is not comparable in angularity or arrangement to any moraine I ever chanced to see; and in the water-worn surfaces of the pebbles it is rather comparable to the rounded chalk flints in many gravels; being in truth less angular than much of the drift of the Midland Counties, Anglesey, or the Caernarvonshire beds with marine shells. Like these, too, it bore to my eye the signs of aqueous deposition; the occurrence of great blocks both *on and in* these gravels I cannot but connect with the circumstance that similar drift-like strata encircle the Lake of Geneva, rising high above its level, and from thence range across the lowlands of Switzerland, at the base of the Jura, towards Zurich and Schaffhausen, covering the hills hundreds of feet above the level of the lakes of Zurich and Zug, each of which lies more than 100 feet above the Lake of Geneva.

If this view of the subject be correct, it follows that during part of the period when the North of Europe was submerged to receive the Drift, Switzerland also lay beneath the sea, *at least* 2000 feet beneath its present level, that being about the height of the blocks of Monthey above

the sea.* Connecting this drift with the original extension of the Swiss Glaciers, it seems more than probable that many of the greater glaciers found their way down to the level of the sea — as they do now in Norway and in Greenland — from which ice-bergs breaking off floated moraine matter into the Alpine fiords, and outwards across the submerged territories that lay between the Bernese Oberland and the Jura; and thus it happens that on the flanks of the latter range and above Monthey, the stranded bergs deposited their freights, sometimes including those gigantic blocks that now astonish the traveller.† This also accounts for the scattering of numerous boulders all over the intermediate country, and for the mingling of these with stratified and water-worn detritus, the far transported material of which must often have been rounded on the shores, and scattered by floating coast-ice, like the mixed deposits so frequent in the British Drift.

When this view is taken of the old glacial phenomena in Switzerland, it is remarkable how closely it accords with what has been observed respecting the ancient glacial phenomena of North Wales, and the Drift which, surrounding that country, penetrates many of the valleys, and rises far up the mountain sides. This can be better studied as a whole in Caernarvonshire, than in any other part of Wales, and I shall therefore describe Snowdon and the neighbouring mountains as a type.

* In Wales and Scotland the drift rises considerably higher.

The late Mr. Daniel Sharpe attempted to show that the Swiss mountains showed traces of marine erosion; and I am informed by Mr. Smith, of Jordan Hill, who has given so much attention to the Drift, that at Geneva and Berne he saw fossil shells from the superficial deposits of Switzerland like those of our Drift. He considers the Swiss beds undistinguishable from it.

† See also Murchison *On the Distribution of the Superficial Detritus of the Alps* in Phil. Mag.

PART II. — NORTH WALES.*

PASS OF LLANBERIS, FROM THE BANK ABOVE LLYN PERIS.

BETWEEN Snowdon range and the Menai Straits, the country descends to the sea in a series of low undulations, in great part covered by Drift, through which weatherworn bosses of rock protrude, often with rounded outlines, the smoothness of which has been much destroyed by atmospheric influences.

Passing from Caernarvon towards Llanberis, when we reach the marshes near Cwm-y-glo, the Drift disappears

* The striation of the rocks, and most of the moraines mentioned in the following pages, are marked on the map. A few passages near the close of this memoir are extracted from other papers written by myself for the Journal of the Geological Society, the Edinburgh Philosophical Journal, and the Catalogue of rock specimens in the Museum of Practical Geology.

from the valley, the rocks stand out more boldly, and by and by, on both shores of Llyn Padarn, the experienced eye has no difficulty in distinguishing clear evidences of glacial action; for the rocks where unweathered, are round and mammillated, and their smoothed surfaces are grooved, the striations running north-west in the direction of the valley and of the length of the lake. Many beautiful instances of this occur by the sides of Llyn Padarn; and one most obvious example may be seen in a little rounded islet, near the lower end of the lake, close by the railway. With a little search, numerous like examples may be found on the rocky slopes many hundreds of feet above the level of the lake, and on these all the striæ run north-westerly. On the map I have traced them in forty-six places, over a space nearly two miles in breadth, between the northern slope of Bryn Mawr and Clegir, the lake lying between. Here and there, on the side of Clegir next the lake, little patches of moraine matter lie amid the rocks, while beyond its north-eastern slope, there is a broad expanse of Drift stretching towards Nant Francon.

The same is the case by the sides of Llyn Peris, both low and high; — as, on the unbroken surfaces of rock amid the great slate quarries, below Elidyr-fach; on the opposite slopes of Cwm Ael-hir; and far above to the very summits of Pen Carreg-y-frân and Derlwyn; — where indeed the striations fairly cross the watershed, and strike nearly westward, in a manner comparable to the change of direction of the groovings on the summit of the ridge below the Bettenhorn, that divides the valley of the great Aletsch glacier from that of the Rhone. Blocks of felspathic porphyry, that have travelled from the higher mountains of Snowdon, lie scattered about; and on the very

summit of the ridge near Derlwyn, one stands perched on the crags in a manner at once suggesting that it was deposited where it now stands, by ice.

BLOC PERCHÉ NEAR DERLWYN, PASS OF LLANBERIS.

A beautiful glaciated surface of hard Cambrian grit may be seen by the bend of the road, near the Coppermine, above Llyn Peris, close to the small octagonal building marked "office" on the Ordnance map, where the striations running down the valley are as fresh as if the ice had but lately disappeared. Other rounded surfaces slip into the lake, others form mounds of rock above the road, and finally, often decayed, they pass far up among the Cambrian grits, to the very summit of Pen Carreg-y-frân. On the opposite slopes, at the mouth of Cwm Dudodyn, the rounded forms are also apparent, but the finer glacial markings have often disappeared from the softer surfaces of the slate.

Up the Pass, every step beyond Llyn Peris, the evidences of a vanished glacier become more and more apparent. Erratic boulders mingled with smaller moraine matter, lie by the roadside and up among the rocks, easily distinguished by the experienced observer from more modern blocks and talus that lie below the weathered cliffs. On both sides of the valley, the rocks, strewn with blocks, frequently present the well-known *moutonnée* form, more or less perfect; and this is especially obvious towards the turnpike gate, and near Pont-y-gromlech, where great

bosses of felspathic porphyry rise like little hills in the middle of the valley, something like miniatures of that behind the Grimsel. Though their sides are scarred by the winter frosts, their summits, roughened by the weather, still retain the familiar largely mammillated form impressed on them of old by the grinding ice; and while the tourist, who sees something in scenery beyond mere external form, is often puzzled to account for the numerous blocks, that, perched on precarious points, seem as if they ought to have taken a final bound into the lower valley, the well-pleased eye of the geologist versed in ice, at once detects that they were let gently down where they lie by the melting of the diminishing glacier.

Further up the valley, behind Blaen-y-nant, a brook descends from the hollow of Cwm-glas. A little way up its banks a good-sized moraine, afterwards to be more particularly noticed, has been cut through by the stream, and bends up both its banks. Above this, going up the pass, the ground on the right is all covered with moraine débris, and nearly opposite the great fallen blocks of stone, miscalled a Cromlech, a huge mound worthy the name of a hill rises in the valley between the road and the upper side of the entrance to Cwm-glas. So large are some of the angular blocks with which it is studded, that for some time I was doubtful if the hill did not chiefly consist of a solid mass of felspathic porphyry, but the mixed nature of its fragments, its form, and position, after many a visit, forced me to the conclusion that it is the relics of a large moraine shed from the upper side of a glacier that once descended from Cwm-glas, and abutted on the opposite side of the Pass.

Further up, near Pont-y-gromlech, there are other traces of moraines, and several erratic blocks, one of them of greenstone, lie perched on a rounded rock of felspar porphyry already mentioned that overlooks the bridge. The

ROCHE MOUTONNÉE WITH BLOCS PERCHÉS, NEAR PONT-Y-GROMLECH.

striations on its surface are almost all weathered away, but such as are traceable trend towards Llyn Peris, and, as is frequently the case, the more broken side of the *roche moutonnée* also faces down the valley. Right opposite this, on the Snowdon side of the valley, a great dark wall of rock rises abruptly from the broken lower slopes, about a quarter of a mile from the road. From the bottom of the Pass it looks almost inaccessible, but half way up there is a rough terrace, at the foot of a greenstone dyke that forms

in part the face of the cliff. The slope of the precipice is about 68° towards the Pass, and in one place especially the wall of rock is polished, and deeply striated in at least six principal deep grooves, which slope down the valley (not down the hill) at an angle of 12°. Some of them, are deeply graven, from two to two and a half feet wide, and twelve or eighteen inches deep, and they run so symmetrically along an almost vertical wall of rock, that the idea is at once suggested to the mind, that they were formed by the long-continued pressure of a glacier so large, that it filled the valley to a far greater elevation than the grooves, and by reason of the huge superincumbent mass of ice, a middle stratum, as it were, of the glacier was jammed against its bounding walls so powerfully, that by help of the grinding of imprisoned stones, in time, it wore out the deep furrows still so perfect.

To the very top of the Pass the same kind of evidences, both of moraine débris and striation, continue unabated, especially on the *higher* slopes on the north-eastern side

ROCHE MOUTONNÉE AND BLOC PERCHÉ NEAR THE TOP OF THE PASS OF LLANBERIS.

of the valley, where above the modern shingle and broken cliffs that overlook the brook, numerous *roches-moutonnées*

remain, still partially unweathered, here and there dotted with *blocs perchés*. By the road at the twelfth milestone a good instance occurs of *roche moutonnée*, easily seen by those who are satisfied with roadside geology. Its curving outlines are perfect on the top, but at the sides it has been shattered by the weather.

Close by the water-shed at Gorphwysfa, striations in the rocks still run north-westerly in the direction of the Pass, like those now forming at the snowshed of the Upper Aar, and other glaciers. Once fairly across the watershed, where the valley widens, they rapidly curve round with the average slope of the ground, some passing in the direction of Nant Gwryd, towards Capel Curig and others down Nant Gwynant.

Thus far some of the more obvious glacial phenomena in the Pass of Llanberis can scarcely fail to strike the most hasty observer, and if we ascend some of the tributary valleys that run upwards into the heart of Snowdon, they become still more impressive.

This mountain, the highest and noblest in the district, is bounded on three sides by valleys, which in all respects are unsurpassed in geological interest and wild beauty, by any in the North Wales. On the north-east lie the bare crags of the narrow Pass of Llanberis, on the east the softer beauties of Nant Gwynant, and on the west the long drift-covered slopes of the broad depression that runs from Llyn Cwellyn to Beddgelert. In the midst of these, the mountain rises in a tall peak 3571 feet above the sea, its base being formed mostly of old lava beds of felspathic porphyry, and the topmost thousand feet chiefly of stratified felspathic ashes. In these rocks six vast hollows have been scooped out by time, forming the wild upland valleys of Cwm-glas-bach, Cwm-glas, Llyn Llydaw, Cwm-y-llan, Cwm-y-clog-

wyn, and Llyn du'r Arddu, in some of which the signs of glacier ice are perhaps even more striking than in the Pass of Llanberis itself.

Just above the turnpike-gate in the Pass, Cwm-glas-bach strikes up towards the top of Snowdon. The cliffs of Llechog, formed of felspathic porphyry, bound it on the west. A lower ridge separates it from Cwm-glas on the east, and its upper end is formed of a rough semicircular sweep of beds of consolidated felspathic ashes. The rocks at the end of the valley, often bare of vegetation, were partly smoothed by a glacier that descended from the snows of Crib-y-Ddysgyl, and further down the felspathic porphyry soon begins to show strong signs of glacial abrasion, which continue all the way down to the Pass. These surfaces, though decayed and roughened by age, and weathering and splitting at the joints, are still often wonderfully perfect in form. Distinct striations are, however, rare, but when they do occur, they run north and north-north-east, that being the direction necessarily given to them by a tributary glacier, that in the latter days of this glacial period descended the valley to swell the main mass of ice in the Pass.

But it is in the adjoining valley of Cwm-glas that some of the most perfect remains of glacier action are to be found. First there is the immense moraine heap, lying between the precipice south of the road and the supposed Cromlech. As already stated, I believe it to have been formed by a glacier that descended northward from the high recesses of Cwm-glas, and which fairly crossed the Pass, till its lower end abutted in the south side of Y Glyder-fawr below Esgair-felen. On the side of this glacier that faced the Pass, there being no running water to bear away the débris, moraine matter might well be

shed and accumulate to a vast amount, in the manner that appears to have taken place, on a larger scale, from the upper side of the Glacier des Bois when it formerly crossed the valley of Chamouni; while from the side of the glacier that faced down the valley, the chief part of the moraine would naturally be destroyed almost as fast as formed, by the streams that flowed from beneath the ice; just as at present in Switzerland the terminal moraines of the Rhone glacier and of the lower glacier of the Aar never gather to an amount at all commensurate to the quantity of débris that is constantly floated down to them on the ice. Since the disappearance of the glacier of Cwm-glas, the stream that drains the Pass of Llanberis has cut away a large part of the great upper moraine, but a large section of the rubbish still remains to attest its former magnitude. Subsequently, when the glacier decreased, and retired behind the spot, where the house of Blaen-y-nant now stands, the ordinary terminal moraine was shed from its extremity, and clear traces of the débris still run in a long broad north-western line that crosses both the brooks on either side of the house. Not far behind the house there is a large moraine lying on the slope of the hill on both banks of the western brook. It consists of heaps of clay, boulders, and angular gravel and blocks, identical in composition and in general aspect with many Swiss moraines. Some of the stones are scratched, the lines crossing each other confusedly, and the great mass of the moraine is formed of three or even four concentric elliptical mounds, which merge together at their bases, and mark on a small scale the gradual decrease of the Cwm-glas glacier. These circle round the north end of a *roche moutonnée* that, in the middle distance of the following drawing, rises like a little hill.

A little behind the hill, about half a mile south of Blaen-y-nant, a beautiful and most perfect terminal moraine, grass grown, but still strewn with travelled blocks, ranges

MORAINES AND ROCHES MOUTONNÉES AT THE MOUTH OF CWM-GLAS.

across the valley between the brooks, almost as regular in form as many an artificial earthwork. It is between 1200 and 1300 ft. above the sea. Higher up on the west side of the valley, the striæ on the rocks run N. N. E. below the space where the glacier in a white cataract of ice once rolled over the cliffs that now appear so grim. Three white threads of water glance on its black cliffs, the sole representatives, in another form, of the jagged ice-fall, that, on a smaller scale must have resembled the great cataract of the glacier

of the Rhone. Inaccessible as it looks from below, the slope, though a little toilsome, is easy of ascent, and beyond the rocks, there lies, in the innermost recess of the mountain, an upland valley, unmatched in Wales for wildness, and in which I never met a human being, though I have been in it more times than I can tell. On three sides it is bounded by tall cliffs and mountain peaks, in the midst of which lie two little deep clear tarns, about 2200 feet above the sea, each in a perfect basin of rock, in this, on a small scale, resembling Todten-see, and the lake behind the Hotel of the Grimsel. Between these pools and the cliff below, an immense quantity of moraine débris, derived from Crib-goch, encumbers the ground. The rocks are often perfectly smoothed, rounded, and deeply grooved; and the striæ that lower down the valley strike straight towards the Pass, here branch to the south-west and south-east, following the course of two minor valleys, that bifurcate at the south end of this recess, on either side of a peaked ridge that descends from Crib-goch to the ground between the pools. Tiny moraine mounds scattered about, tell of the last remnants of enduring ice, ere the shrunken glaciers finally melted away in the uppermost recesses of the mountain.

Having reached the upper end of Cwm-glas, if the explorer be indifferent to the hackneyed route of the posting tourist, he cannot do better than climb the ridge of Crib-goch, and walk along its edge towards the summit of Snowdon. There, if the weather be clear, he may see below him three of the glacier valleys that radiate from the summit of the mountain. The rocky amphitheatre of Glaslyn and Llyn Llydaw lies in the east, the deep descent of Cwm-y-Llan on the south, and on the west the broad, precipitous, circular hollow of Cwm-y-Clogwyn, in which, with a favour-

able light, he may see the terminal moraine of an old minor glacier, faintly circling the west side of the central pool of Llyn-goch. This is best seen from the sharp ridge that leads to Beddgelert.

Near the route back to Llanberis, a great moraine lies on the north and west of Llyn du'r Arddu. This deep-set little tarn (that often rests so still, even when a gale is blowing) lies at the base of a high cliff of felspathic porphyry and greenstone, mostly inaccessible except at its eastern end. Once with a companion I climbed it in a frosty December morning, after a slight fall of snow. It took an hour or more, for we were obliged to help each other with straps, and occasionally to cut steps with our hammers in the ice and crumbling rocks. By the outlet of the lake the striæ on the rock run north-westerly, and a large *roche moutonnée* lies a little nearer the cliff, sprinkled with *blocs perchés*. The stony moraine-mound, covered with angular blocks from the neighbouring heights, circles round the lake, and rising high above it on the north descends in a long steep slope for more than half a mile down Cwm Brwynog. From the old mine-shed by the road, successive concentric heaps of moraine rubbish are distinctly visible, the highest of all being about 2250 feet above the sea. Huge blocks lie scattered on its surface, one of which, half way down the slope, measures about 18 yards by 14 by 10. A loose stone, several yards square, not a severed part, lies on its summit, probably in the very position it occupied when both were left by the ice.

At first it is difficult to understand how a moraine so large could have been deposited by so small a glacier, for the upper side of the moraine lies little more than a mile from the peak of Snowdon, and less than a mile from the slope of Crib-y-Ddysgyl, from the snow-drainage of which

the glacier was formed that flowed over the eastern end of the cliffy ground, and passed down the hollow of Llyn du 'r Arddu. But the difficulty is lessened to those who have seen the prodigious amount of débris that often fringes the sides and ends of some of the small glaciers that lie on the higher slopes of the Alps. These, once united to the great glaciers that fill the valleys below, are now, shrunk in size, no longer strong enough to join them, but melt and deposit great heaps of rubbish on the adjacent slopes.

Beyond this moraine, with sufficient search, many ice-rounded surfaces of rock may be seen in Cwm Brwynog, their original situations being often decayed, but when visible they run north-west and north in the direction of the slope of the valley.*

On the west, close below the peak of Snowdon, lies Cwm-y-Clogwyn, enclosing three little lakes. It is easily reached in less than two hours from Llanberis, either by the route of Bwlch-y-Maescwm, or by Bwlch-y-Cwm-brwynog, at the west end of the precipice of Clogwyn-du 'r Arddu. Immediately below this watershed, on the south, the lake called Llyn Ffynnon-y-gwas is possibly dammed up by a moraine, merging into the long slope of drift that runs down to Llyn Cwellyn.† A cliffy escarpment, over which the brooks leap, crosses the entrance to Cwm-y-Clogwyn, but it is easily accessible, and on the summit of a kind of table-land lie the three tarns, circled by crags, the loftiest of which, — Pen-Wyddfa, — or the peak of Snowdon, shoots high into the air, more than 1500 feet

* I have, however, often thought that the lower part of this valley is covered by Drift, and that if a tributary glacier from it ever *joined* the main one in the Pass, it must, of course, have done so before the deposition of this drifted material.

† See p. 458.

above the lakes. The whole valley is what in the Highlands of Scotland would be called a Corrie (or cauldron), a Celtic name that still lingers in Wales on the north face of Cader Idris, though its meaning is now lost to the Welshman.

On the ice-worn surfaces of greenstone and felspathic porphyry, which form the bottom of the valley, striæ are easily found, running north-westerly towards its mouth. It is difficult to unravel all the minuter details of the glaciation of a valley from which enduring ice has so long vanished; but after many a visit, I came to the doubtful inference, that a glacier probably at one time covered the whole bottom of the Cwm, which is still more or less covered with true moraine matter. This inference is rendered not the less probable by the circumstance that due west of Llyn-y-Nadroedd the rocks are polished and grooved to the top of a low part of the ridge, as if the glacier had once filled the bottom up to this point and overflowed towards Llyn Cwellyn.* Afterwards, as the supply of snow decreased, or the climate ameliorated, the glacier seems to have much diminished and split into three, for a minor moraine encircles Llyn-y-Nadroedd on the north and east, and another beautiful small one made of angular blocks and stones, now covered with vegetation, bounds Llyn-goch on the west and south-west, while a third dams up Llyn-glas. A long broad heap of débris runs in the direction of the length of the valley between Llyn-y-Nadroedd and Llyn-goch, perhaps shed from two minor glaciers passing down to the lakes. From the opposite sides of the glaciers, the débris toppled over and formed a mound between them, on which three enormous blocks of porphyry still lie.

* Unless formed by drift ice. See p. 456.

Of all the valleys that lie in the heart of Snowdon, the largest and most magnificent is that of Llyn Llydaw. It is easily reached from Llanberis over the summit of Snowdon, or by Cwm-glas over the ridge of Crib-goch; but both for the lovers of wild scenery and for those who specially care to observe its glacial phenomena, it is better to go up the Pass of Llanberis to Gorphwysfa, and so strike into the valley; or, if there be time, to cross the broken ground to the right of Nant Gywnant, and from thence ascend Cwm Dyli by the cataract to Llyn Llydaw. The route is most instructive, especially if the sides of the Pass have been explored before; for then, up to the watershed of Gorphwysfa, the eye readily comprehends all the combined signs of an old glacier of the largest size in Wales, especially when habit has accustomed the explorer to detect in every stage of decay the marks left by the glacier. As already mentioned, for hundreds of feet up the side of the valley, all the striations run north-westerly *along* the hills, except in tributary valleys, or occasionally at great heights, where they sometimes merge a little towards the Pass, as in the higher part of the hollow above Pont-y-Gromlech, that leads up to Y Glyder-fawr; or on the hillside about half a mile due west of Gorphwysfa, and again on the watershed directly west of Llyn-y-Cwm-ffynnon, where they run both towards the Pass and Nant Gwryd.*

Close by Gorphwysfa the striæ run across the watershed, as if at its culminating point the piled-up snow and ice had flowed in two directions, on one side down the Pass, and on the other towards Nant Gwynant. At the corner of the road at Bwlch-y-Gwyddel some of them run east and west, as if part of the radiating mass

* See p. 441.

turned down Nant-y-Gwryd, where the grooves run about E.N.E. towards Capel Curig. On the opposite side of the brook that runs from Gorphwysfa to Nant Gwynant, they strike E. and S.E. with the run of that branch valley; but on a lower level, at the mouth of Cwm Dyli on both sides of the waterfall, they run nearly due east over the top of the cliffy ground, showing that a glacier once passed through this opening into Nant Gwynant. Further south, opposite Gwastad Agnes, and on the northern part of the ridge of Gallt-y-Wenallt, the grooves on the rounded rocks strike S.E. and S.S.E., and finally curving round to the S. and S.W. they strike fairly down the valley on the western side of Llyn Gwynant, and right across the mouth of Cwm-y-llan.

The meaning of the direction of the striæ at the mouth of the Cwm Dyli is this:— A glacier, about three miles in length, flowed eastward, from below the peak of Snowdon, through the valley of Llyn Llydaw and Cwm Dyli, and united with a stream of ice, that, when the glaciers of Wales were at their largest, descended from the direction of the top of the Pass of Llanberis and Pen-y-Gwryd, where the ice was then of very great thickness, representing the accumulated snow-drainage of a large part of the broad mountain slopes that lie between the eastern peak of Crib-goch and the southern fall of Y Glyder-fawr. I consider that the result of this was to produce a mass of ice not less than 500 feet thick, just above the present watershed at Gorphwysfa, for without this I cannot account for the longitudinal glacier striations running *along* the sides of the Pass of Llanberis 1300 feet above its bottom.* If this hypothesis be correct, then it follows

* See p. 441.

that in other directions the mass flowed down towards Capel Curig and Nant Gwynant, being so thick at Gorphwysfa, that its surface was higher than the broken ground between Llyn Teyern and the upper part of Llyn Gwynant. On this ridge, overlooking the bottom of Cwm Dyli by the waterfall, the striations strike south-easterly, as if the greater glacier had quite overridden the mouth of this valley on its northern side, while on the opposite side the striæ indicate that the tributary glacier filled Cwm Llydaw so high, that it overflowed its southern bank on Gallt-y-Wenallt, where the ice rolled over the ridge south-easterly, and then curved round to the south, to swell the great glacier of Nant Gwynant. Whether under these circumstances, in the depths of Cwm Dyli by the waterfall, an undercurrent of ice might have flowed easterly beneath the great mass that covered the mountain, I cannot determine; but it is needless to have recourse to it, since the striæ by the waterfall might subsequently have been produced by a diminished glacier, that in the latter days of the ice flowed through Cwm Dyli.

By the waterfall of Cwm Dyli there are symptoms of a small terminal moraine, and all through the valley above this hollow, there are numerous moraine mounds, sometimes running up the valley in rude lines, some of the blocks on which are ten or twelve yards in diameter. Half a mile further, north-west of Llyn Teyern, the rocks have been well polished by ice, and the great bosses of greenstone, that rise in the midst of the valley like isolated hills, are nothing but huge *roches moutonnées*, here and there dotted with felspathic blocks resting on their sides and summits. When at its largest, the glacier overflowed these, but as it declined there are ap-

pearances that seem to indicate that it branched and wound between the islands of rock, and, decreasing still further, deposited its moraines in lines, where separate tongues of ice protruded from among them.

Approaching Llyn Llydaw, the full grandeur of this wonderful valley bursts on the beholder. A lake rather more than a mile in length and of a green colour, like some of the lakes of Switzerland, runs obliquely across the valley.* Around it rise the cliffs of Lliwedd, Cribgoch, and Pen Wyddfa, seamed with veins of white quartz looking like streaks of snow on the tall black rocks that circle the vast amphitheatre, the scarred sides and ragged outlines of which, sharply defined against the sky, may well seem, till attempted, hopelessly inaccessible to the unpractised climber. In every season and phase of weather, there is a charm in this valley to the lover of the mountains. In quiet sunshine, when the rocks, and perhaps a lazy ferry-boat, are reflected in the still water; or while the wanderer scales the crags amid the seething mists; or when the pitiless rain, or hail, or snow, comes driving down the valley; but best of all, in a threatening evening, when the gathered clouds, like the roof of a vast cavern, hang heavily from side to side on the edges of hills; and a streak of light caught from the setting sun, shows redly behind the dim peak of Snowdon, grimly reflected in the sombre waters of the lake.

The signs of glacier ice are so evident in Cwm Llydaw that it is needless to describe all the details. At the outflow of the lake there are a number of moraine-like mounds, formed of earthy matter, stones, and great angular and sub-angular blocks, which even now partly dam up

* About 1800 feet above the sea.

the lake, and when I first knew it, raised it to a still higher level, ere the channel of the brook was sacrilegiously deepened to lower the water, for the sake of saving a few pounds in the construction of an ugly causeway. The once beautiful little islets of rock, feathered with heath,

ROCHES MOUTONNÉES, BLOCS PERCHÉS, AND MORAINE-MOUND BY LLYN-LLYDAW.

close to the outflow, are now united to the mainland, and a broad ugly black rim round the lake marks alike the extent of the drainage, and the barbarism of the perpetrators of this unhappy outrage on the most beautiful scene in North Wales. Between the upper part of Cwm Dyli and the north end of Llyn Llydaw, above the brook, there are magnificent *roches moutonnées*, once overflowed by the glacier; their sides and summits, from 200 to 300 feet above the lake, being still strewn with moraine débris and numerous *blocs perchés*, scattered on the rocks. On the little peninsula below, the striæ running east-north-east show the direction of the flow of the glacier, which,

unchecked by the hill beyond, passed right over the rocky barrier. From signs higher up the hill, I believe that at one period the ice must have been here at least 500 feet thick, and I incline to think that it was even much thicker. On the opposite side of the lake, the moraine heaps, of large blocks, clay and angular stones, sometimes scratched, are remarkably apparent; and in the great recess below the cliffs of Lliwedd, the rocks are wonderfully rounded and dotted with moraine matter and scattered blocks, at least 500 feet above the level of the lake. In the curve of that recess there are striations somewhat converging towards the bottom, in the manner that might be expected to be produced by ice pressing both down the greater slope, and outwards towards the mouth of the valley; and well up, on the broken spur of rock that runs from Lliwedd towards the efflux of the lake, the striæ turn suddenly round more easterly, where once the ice flowed high across the ridge and escaped down Cwm Dyli into Gwynant.

Beyond Llyn Llydaw, a white torrent leaps down the rocks that lead to Glaslyn, which lies about 2000 feet above the sea, in a semicircle of cliffs, close below the peak of Snowdon. This lake, if report speaks truly, it was actually intended entirely to drain, in search of some doubtful copper lodes, by an adit driven upwards from the broken ground above Llyn Llydaw! All round the lake the felspathic porphyries and consolidated ash-beds are *moutonnées;* and, even when most weathered, enough of these forms remain to attest their glacial origin. They are unusually striking on both sides of the stream, especially on the south, and on them scattered blocks lie perched in many precarious places. Striæ on the ice-worn surfaces are also plentiful all round the lake.

They run more or less easterly in the direction that it is easy to see must have been given them by the gathered ice of this high recess seeking an outlet; and on the higher banks north, south, and west of the lake, they often slightly converge towards the bottom, in the manner we might expect from ice pressing down the high banks, and at the same time outwards towards Llyn Llydaw.

Beyond Glaslyn, ascending the ridge by a zig-zag path that joins the Llanberis route to the top of Snowdon, or climbing the hills on the south side of the lake, it is easy to descend into the upper part of Cwm-y-Llan, a winding valley that leads to Nant Gwynant between Llyn Gwynant and Llyn-y-Ddinas. Beddgelert may then be reached by a walk of less than four miles along the turnpike road.

Immediately below the peak of Snowdon in the bottom of Cwm-y-Llan, a moraine mound about half a mile in length runs nearly north and south, formed perhaps in the latter days of the snow and ice that slipped from the high cliffs of Bwlch-y-maen and Pen Wyddfa, or possibly from the broader opposite slopes between Bwlch-y-Saethau and Lliwedd. It consists of the usual heterogeneous assemblage of angular blocks, stones, and clay, derived from the hills above. These materials run in a somewhat waving curve, forming a series of united mounds, which in general character are undistinguishable from many a Swiss moraine. Some of the fragments are scratched. Standing on the summit of the moraine, or seen from below, it forms a striking object, especially taken in connection with the ice-worn surfaces of rock on the sides of the bounding hills. On these the striæ run more or less

southerly, slightly converging towards the bottom of the valley. Farther down on both sides the glaciated aspect of the hill sides is still more imposing, especially on the slopes below Yr Aran, where the ice-worn surfaces contrast almost as strongly with the craggy upper part of the ridge, as the *roches moutonnées* above the glaciers of the Aar do with the sharp serrations that form the crests of the mountains. In both cases the same tale is told, of a time when ice filled the valleys almost to the brim, and the upper edges of the mountains rising above its surface were scarred by the rending frosts.

In the angular recess below the peak of Yr Aran, some of the striæ run north 25° east, and were formed at a period in the history of the glacier when the ice pressed directly down towards the bottom of the valley. At other places further down they strike east and east-south-east with the trend of the valley, then south-east in the narrow gorge by the mine, where the extra pressure of the mass of ice, forcing its way through the strait, ground the surface of the rocks so strongly, that to this day it seems as if the glacier had but lately disappeared. Below the gorge the striæ bend to the south, where the ice-flow curved round to join the great glacier, formed by the snow drainage of the valley of Llyn Llydaw and the mountains above Pen-y-Gwryd, which, passing right down to Beddgelert and Pont Aberglaslyn*, formed the south-westerly striations that here and there mark the harder unweathered rocks of Nant Gwynant. No definite moraines occur in Cwm-y-Llan, besides that at the top of the valley, but

* Near Pont Aberglaslyn Buckland observed the striation of the rock, on the west side of the gorge. A framed inscription records it, in his own writing, in the hall of the Goat Hotel, Beddgelert.

débris and scattered blocks are numerous, and one of unusual size has been left by the retreating ice just above the gorge.

Such is a brief account of some of the more striking glacial phenomena round Snowdon. The mountain formed the centre of six glaciers that flowed from the direction of the peak down the valleys of Cwm Brwynog, Cwm-y-Clogwyn, Cwm-y-Llan, Llyn Llydaw, and Cwm Dyli, Cwm-glas, and Cwm-glas-bach. Two of these, from Cwm Dyli and Cwm-y-Llan, flowed into the larger glacier-valley of Nant Gwynant, two passed out to the west, and the glaciers of Cwm-glas-bach and Cwm-glas contributed to swell the mass of the great glacier that descended the Pass of Llanberis. After a few days spent in exploring these recesses, the mind readily embraces the whole subject, and a short walk from Llanberis on the heights of Snowdon, along the ridges from Llechog to Crib-y-ddisgyll and Blaen-y-maen, enables the glacialist mentally to restore the whole series of glaciers that radiated from the central peak.

The fact that the valleys of North Wales were once traversed by vanished glaciers implies that the ice must have passed through many phases.

Before the commencement of the Newer Pliocene period, and after the greater contours of the country were much as they are now, there were probably for a time no glaciers. After this they began, attained a maximum size, dwindled, and finally disappeared. Reflecting on these things, it became an object with me, in the year 1854, to endeavour to ascertain what might have been

the greatest thickness of the ice in the Pass of Llanberis. For this purpose I made a series of observations with the sympiesometer, to determine the height above the bottom of the valley of the highest striations that run south-east and north-west, or in the direction of the flow of the glacier. The method was simple: first, by mapping the striæ I rendered myself familiar with the glacial phenomena of the valley. I then selected ten or twelve favourable points, and at each made first an observation with the instrument in the bottom of the valley, and then ascending the hills on both sides at right angles to it, I thus determined the height above the bottom at which striations were found running *along* the hills in the direction of the general fall of the Pass; thus:

PASS OF LLANBERIS.

a, the bottom of the Pass; *b*, *c*, the highest points at which striæ were observed running north-west along the sides of the valley; *a*, *d*, the thickness of the ice.

If, as I believe, the striations at *b*, *c* were made by a glacier that flowed down the Pass, then the line *a*, *d* represents approximately the thickness of the ice at one period of its history; and unless the glacier, by long-continued erosion of its rocky floor, contributed much to deepen the valley, the average thickness of the ice was from 1100 to 1300 feet. To produce a glacier-stream flowing down the valley and filling it to heights so great half way down the Pass, the accumulated ice beyond and

above, at the present watershed of Gorphwysfa, could not have been less than about 500 feet thick. That glaciers must deepen their valleys is self-evident, and therefore the above estimate cannot be strictly correct. But it is nevertheless of sufficient value to warrant the conclusion, that when the Welsh glaciers attained their largest size, the ice was of very great thickness; and therefore,—considering the shape of the ground and the ice marks,—of a length so great, that it flowed well down across the lower hills that skirt Llyn Padarn.

It would be easy to give descriptions of other valleys in many respects quite as remarkable as those of Snowdon, more especially of Cwm-du beneath Mynydd-mawr, about a mile west of Llyn Cwellyn; of the country between the river Conwy, Afon Llugwy, and Nant Francon; of the valleys leading up from Traeth Mawr towards Cynicht and Moelwyn; and of Cwm Orthin, near Ffestiniog, which I recommend all walking tourists to ascend, and to look out for a series of magnificent *roches moutonnées*, and *blocs perchés* below the mouth of the lake, which are best seen looking down the valley. But I refrain from such descriptions, and shall content myself with a brief account of Nant Francon and some of its tributary valleys, which show, in a striking manner, all the familiar signs of glaciers.

Between Bangor and Bethesda (of late sometimes called Glan Ogwen), the lower ground is more or less covered by Drift, through which here and there bosses of glaciated rock protrude; as, for instance, on the eastern flank of Moel-y-ci, near Pont-y-coetmor, and in the neighbourhood of Bethesda.

South of the Penrhyn slate-quarries the valley nar-

rows as we enter the Pass of Nant Francon, and the mountains rise grandly on either side; on the left in a long steep-sided hill, while on the right the ridge is bold, irregular, peaked, and penetrated by tributary valleys. In the bottom, between Ogwen Bank and the falls of Llyn Ogwen, the river wanders through marshes and flat meadows, which I often incline to think may at one time have been dammed up on the north, to form a lake, at a spot not far above the slate-quarries, where the Cambrian and Lingula grits striking across the valley, have been ground by the old glaciers of Nant Francon into *roches moutonnées*, as perfect as any in Wales. These are easily accessible on the left bank of the river, where I shall therefore describe them.

From Ogwen Bank to the ground opposite Tyn-y-maes, for a distance of a mile, all the low ground by the river is occupied by smoothly glaciated undulating rocks, marked by numerous smaller mammillations, and dotted with erratic blocks, chiefly of felspathic porphyry. The larger curved surfaces are especially prominent, because of the hardness of the grits, which are here interstratified with softer slaty beds. The latter having been more easily worn away and reduced to a lower level, the grits are left standing out in relief*, and are strongly grooved, all the striæ running down the valley in a direction a little west of north. Any one who will take the trouble of ascending Cwm Ceunant will also find striæ in the lower part of the valley†, running in the same direction; and, what is more remarkable, on ice-worn Cambrian grits

* This helps to throw light on the manner of formation of some of the rock basins that contain lakes.

† About half a mile W.S.W. of Pen-y-gareg.

that form the shoulder of Bronllwyd, at a higher level than the Penrhyn slate-quarries, well marked striations follow the same course about 700 feet above the river, intimating that at a certain period the ice of the glacier was here at least of that height. This ridge is worth the ascent were it for nothing more than the marvellous view, from such a foreground, of the great mountain recesses that once formed the sources of the glacier. In the middle the sharp cone of Y-Tryfan rises like the fragment of a great wall, seemingly inaccessible (even when close below), although in reality it may be scaled without much difficulty among the shattered blocks of stone that lie in strange confusion on its steep western side. On the left of Nant Francon there rises the long ridge of Pen-yr-Olen-wen, gradually increasing in height, and ending in the broken cliffs of Craig-yr-hysfa; and on the right are the recesses of Cwm Bochlwyd and Cwm Idwal, the old parent-basin of the glacier, surrounded by the crags of the two Glyders, so steep that in places they are inaccessible.

In the bottom of Nant Francon above Pen-y-gareg, the signs of the glacier, from the nature of the rocks, become less striking. The slopes are, however, here and there sprinkled with travelled blocks, one of which, of large size, stands by the road at Pen-y-gareg itself. It is of felspathic porphyry, and was probably derived from the cliffs of Craig-yr-hysfa, or Cwm Idwal, from two to three miles off. Others lie on the very crest of the ridge of Pen-yr-Olen-wen, one of which, about 2000 feet above the sea, is a block of felspathic porphyry nine yards in length, five high, and two in breadth. Its weight must be about 100 tons. Between Tai-new yddion and Maes Caradoc, by the road, the rocks are polished, and grooved; and

opposite Ty-gwyn an excellent example of a *roche moutonnée* rises in the midst of the alluvial flat, presenting, as is frequent in such cases, its broken side down and its rounded side up the valley in the direction whence the glacier flowed.

Between the Penrhyn slate-quarries and Capel Curig, fifteen tributary valleys branch from Nant Francon and the valley of Llyn Cwellyn and Afon Llugwy. Eleven of these are on the west and south, and four on the east and north. The watershed in the Pass is at Wern-go-uchaf near Llyn Ogwen, and it is easy to infer that west of this and Y-Tryfan the high valleys of Cwm Bochlwyd and Llyn Idwal both contributed a great part of the ice that flowed down Nant Francon. Between Llyn Idwal and Bethesda, each of the six tributary valleys in some way or other tells that it was once the home of a glacier. At Llyn Cywion in Cwm-goch, and in Cwm-bual and Cwm-ceunant, there are scraps of moraines, and erratic blocks; or striated surfaces, from some of which, on removing the turf, I found that the ice-smoothed slate still retained a glassy polish, marked by scratches often as fine as if made with the point of a knife. Those in the upper part of the valleys always follow the general slope, but unfortunately when I examined North Wales, having other geological objects more especially in view, I became at length so familiar with striations, that I often neglected to record them, and I hesitate to draw them on the map, lest they should be out of place.

Taking Nant Francon in connection with its branching Cwms, an attentive consideration of all the circumstances has led me to think that it was so far filled with ice, that the mouths of the minor valleys to a height of from 700

to 1000 feet above the river, were over-ridden by the main stream of ice, which flowed across the lower ends of the spurs that branch from the crested ridge on the west. But, when by amelioration of climate the great glacier diminished, the lower spurs that bound the minor Cwms stood out, partly denuded of ice, while the upland hollows still contained minor glaciers that left markings on the rocks more or less transverse to those that were formed when, from side to side, the lower part of Nant Francon was full of ice. The same is the case with the existing glaciers of the Aar.

In none of the tributary valleys north of Llyn Idwal, are the signs of a small glacier so distinct as in Cwm Graianog, which, on this account, is well worth a visit. From Bethesda it is easily reached from below, and from Llanberis the quickest route is to go up Cwm Dudodyn, and down what some would consider the perilous slope of Moel Perfedd at the west end of the valley. The pedestrian then finds himself in a small craggy valley over half a mile in length, looking across Nant Francon. On the east the felspathic porphyry of Moel Perfedd rises in a rough peak, and on the west the great bare ripple-marked strata of the Lingula grits dip towards the hollow at an angle of 48° or 50°.

At the mouth of the valley above the steep descent to Nant Francon, a small but beautifully-symmetrical terminal moraine crosses the valley in a long crescent-shaped curve, that once passed about 200 or 300 yards up the eastern side of the glacier. On this side, as might be expected, almost every stone of the moraine is a fragment of the felspathic rock of Moel Perfedd, having been shed from the edge of the glacier by a part of the ice

that had that mountain as its source. Further west along the moraine, the material becomes mixed with fragments of grit and slaty sandstone; and by degrees, passing to the

CWM GRAIANOG.

western side of the valley, the moraine matter consists entirely of pieces of the Lingula beds that form the crags of Carnedd-y-filiast. This will be appreciated by any one who has studied lithologically the sources of Alpine moraines, and the gradual mingling of material in its downward flow. In Cwm Graianog the whole is formed of large angular loose stones mixed with smaller débris, through which the drainage percolates. The largest of these lies on the top of the moraine, about 450 or 500 feet above Nant Francon. It was originally eleven yards long, nine broad,

and about one and a half high; but it has been broken into four pieces by the frost. Two small lines of stones descend from the lower side of the moraine, looking as if they had been shed by ice from Cwm Graianog, even though half way between the moraine and Tai-newyddion the rock still shows the north-westerly striæ formed by the great Nant Francon glacier. Inside the moraine, a great part of the bottom of the valley is covered with rubbish and heaps of loose blocks, underneath which, in places, the running water is heard flowing with a tinkling sound. Doubtless much of the smaller débris has been carried away by the water, and the mounds may be partly the result of the falling in of part of the material.

The valley of Llyn Idwal has long been classic ground to geologists, having been the first case in which a special glacier valley in Wales was described in detail.* Its features are simple. The rocks of the valley consist of interbedded masses of grit and felspathic trap, lying in the form of a synclinal curve, and forming on either side the tall cliffs of Y Garn and Y Glyder-fawr. The black wall of Twll-du, famous for its ferns and saxifrages (the relics of an Alpine flora), closes the valley on the south-west, above which, by Llyn-y-Cwn, there is an upland valley, covered with angular drift, leading to the Pass of Llanberis. Below Twll-du, in the bottom, lie the sombre waters of Llyn Idwal, the depth of which I do not know, but which are partly dammed up by a terminal moraine, lowest in the middle, the greater amount of débris having,—as is usual with short glaciers—been brought down at the sides of the ice, where, under the circumstances, the subsequent removal of moraine matter

* See Charles Darwin, Phil. Mag. Ser. iii. vol. xxi.

was also probably less. The water is also, I incline to think, partly retained because it lies in a rock basin ground out by the old glacier. Below the moraine, all the way down to the Ogwen, the rocks are strikingly *moutonnées*, and when undecayed they are covered with striæ, which gradually curve round to take the direction of the main valley. Between Llyn Idwal and Cwm Cywion, on the top of the dividing ridge, high above the north-western angle of the lake, I found grooves running right across the watershed in the direction of Nant Francon, as if Cwm Idwal, before the glacier dwindled to form the still-existing moraines, had at one time been full of ice, at least to the height of these striations, thus overflowing the barrier that divides it from the west side of Nant Francon. If so, it may be that at this period, or when still larger, it abutted on the opposite mountain below Braich-du, thus producing the singular smoothing of the rocks far up the cliff, and striating them transversely to the slope of the hill, in the direction in which the ice would under the circumstances have escaped down the valley.

As the glacier decreased in size it deposited the moraines that now skirt Llyn Idwal, its progressive diminu-

SECTION ACROSS THE MORAINES OF LLYN IDWAL.

tion being marked on the western side of the lake by four moraines arranged in long symmetrical mounds one within

another. There is also some appearance of an inner terminal moraine towards the southern end of the lake, where it narrows; and on the east there are patches of moraine matter and ice-smoothed bosses of rock rising through the soil.

Descending the valley to the outlet of Llyn Ogwen, very perfect mammillated *roches moutonnées* lie in the bottom, covered with straight grooves, running in the direction of the valley. Similar signs mark the lower part of the mountain on the angle of Craig-yr-hysfa, and ice-smoothed rocks, perfect or decaying, rise so high up the mountain towards Braich-du, that, to be appreciated, it is necessary to scramble along and up and down the face of the mountain almost from bottom to top.

Above Llyn Ogwen, there are again ample proofs of glacier action in Cwm Bochlwyd. A little lake here lies in the hollow of this, one of the wildest valleys in North Wales, apparently slightly dammed up by moraine matter; and just beyond the upper end of the lake, there is an immense moraine heap, running nearly across the valley and formed of angular blocks of stone, some of them from six to ten yards in length. Occasionally, these are marked by straight striæ, which do not cross each other, thus showing that these blocks once formed part of the sides of the glacier, and that when it diminished, some of them, rent by the weather, fell on the ice, and were finally floated down to be deposited on this moraine. Frequent *blocs perchés* here, as at Llyn Idwal, dot the *roches moutonnées*, and it is important to note that above Llyn Bochlwyd, striations run south-easterly right up to the summit of the steep and shattered ridge that unites Y Glyder-fach to Y Tryfan; so that here, at one of its sources on the old

snowshed, it would appear that the ice pressed downwards in opposite directions into Cwm Bochlwyd and Cwm Tryfan, and afterwards curving round, helped to form the glaciers that flowed northerly through both valleys on opposite sides of the sharp peak of Y Tryfan. In this, on a small scale, it resembled many an Alpine Pass where, standing on the snowshed, you look down upon opposite systems of drainage.

To avoid further statements similar to those already made, it is now enough to say that in the wild, little-visited mountain tract, that lies between Bangor, Capel Curig, and Conway, there is not a mountain, valley, or lake that to the instructed eye does not show signs of the influence of glaciers; or, more strongly still, of the icy sea of the DRIFT; and I shall now turn to the consideration of the relations of the glaciers of North Wales to these remarkable marine deposits.

Every one who has given any attention to Tertiary geology is aware that a large portion of the low country of the north of Europe, from the Ural to the Atlantic, is more or less covered by what is technically termed DRIFT; that is to say, of loose superficial accumulations of sand, gravel, and clay, charged with rounded, sub-angular, and angular stones and boulders, many of which have travelled for hundreds of miles. Thus the great plains south of the Baltic are covered with fragments of granite and gneiss derived from the Scandinavian chain, an instance of which will occur to many, who remember opposite the Museum at Berlin the great vase or tazza of polished granite, made from a boulder found in the neighbourhood. The plains of Siberia are in great part

formed of similar drift, which penetrates the mouths of the valleys on the northern flanks of the Altai; and all the broad champaigns and table-lands of North America, from the Laurentian chain of mountains to the Ohio, are covered by gravel and clay, well sown with boulders, many of which have travelled hundreds of miles from the gneissic mountains beyond the St. Lawrence. The east coast of England, from Yorkshire to Essex, is in like manner covered by Drift, partly of Scandinavian origin, and all the solid formations of the central plains, from Leicestershire to Worcestershire and the borders of North Wales, are more or less obscured by detritus well charged with boulders, many of which have been transported from Cumberland, Scotland, and Wales itself.

For long it was a favourite dogma that these heterogeneous mixtures of near- and far-transported material were scattered over the northern continents by mighty sea waves, which, rushing from the north, strewed half a world with rubbish, and polished and striated the rocky surfaces over which the débris passed. But now that spasmodic geology is at a discount, more sober imaginations believe that the blocks of stone that strew our continents and islands were chiefly dropped where they now lie, by the same agency—that of icebergs—that is now sowing the Western Atlantic with earth, and erratic boulders, derived from the mountains and coasts of Greenland, where glaciers descend to the sea. The question then naturally arises, What is the relation of the DRIFT to the glaciers that once existed in our own mountain regions?

It is a well ascertained fact that previous to the Tertiary glacial epoch, all the grander contours of hill and valley were in Britain (and elsewhere in Europe) nearly the same

as now. Much of the land was then slowly depressed beneath the sea. As it sank, its minor features were somewhat modified, for terraces were formed on old sea margins, and icebergs drifting from the north, and pack-ice on the shores, ground and grated along the coasts and sea bottoms, smoothing and striating the rocky surfaces over which they passed, and depositing, in the course of many ages, clay, gravel, and numerous boulders over wide areas that had once been land. The grooves and striations on the ice-smoothed rocks (except where locally deflected) still bear witness to the general southward course of the ocean currents that bore the ice from its birthplace into milder climates.

All through Britain and Ireland this drift rises well up on the flanks of the mountains; and in Caernarvonshire, and North Wales generally, the surface is, over large areas, more or less covered by GLACIAL DRIFT, rising from underneath the sea to a height of about 2300 feet on some of the mountains. Near the shore, it has often been re-arranged and waterworn by the sea during terrestrial oscillations of level, but in the high grounds it is generally in its native state, and consists of clay, angular stones, gravel, and boulders, sometimes, as in Cwm Llafar, on the west flank of Carnedd Llewelyn*, arranged in terraces marking pauses in the elevation of the country. Shells were found by Mr. Trimmer, on Moel Tryfan, 1300 feet above the sea, in sand and gravel, and others were found by myself at about the same height, less than two miles west of the peak of Snowdon, on a long slope of drift well charged with

* Near Bethesda.

erratic blocks, one of which, of great size, is known as *Maen*, or the stone.

MAEN, WEST OF SNOWDON.

Much of this Drift, though rudely stratified, singularly resembles ordinary moraine matter in the appearance and quality of its mud, and the polish, approximate angularity, scratched surfaces, and sizes of its stones. From circumstances presently to be mentioned, it is to me certain, that at a time when North Wales was so far submerged that only the higher mountain tops rose as islands,—none of them more than about 2000 feet above the sea, — some of these even then gave birth to glaciers that descended into the sea, and their ends breaking off in icebergs, floated hither and thither, which, as they

melted, deposited their stony freights in the sea. The intensity of the cold may be inferred from this. The sea then flowed through some of the greater valleys between the Menai Straits and Cardigan Bay, across the present watersheds of the Passes. The principal of these are the Vale of Conway, and its upper branches to Capel Curig, &c.; the Pass of Nant Francon, and its continuation between Llyn Gwynant and Capel Curig; the Pass of Llanberis (about 1000 feet high at the watershed), opening into Cwm Gwynant; and the Valley of Afon Gain, between Caernarvon and Beddgelert. The country was thus broken into a group of islands, each one of which in great part had its covering of snow and ice, permanent till large changes (perhaps of physical geography) produced a decided amelioration of climate.

It is, therefore, not improbable that before this change took place, in other portions of the islands not possessed of the form requisite to originate massive glaciers, snow and glacier ice may nearly have covered their entire surfaces; for, unless the cold were sufficient to produce such a result, it is difficult to understand how on other parts of these small islands, good-sized glaciers, such as then certainly filled the valleys, could have been produced. But if this covering of snow and ice did exist, it is very intelligible how the drift on the sides of the mountains is generally composed of stones from the hills close above, and is also more or less moraine-like in its character. In fact it is not till we reach the comparatively distant low ground of Caernarvonshire, near the sea, and the plains of Anglesey, that far-travelled fragments from doubtful or unknown regions begin to occur in Drift deposits. Under any such circumstances, small icebergs and coast-ice grating

along the shores and sea bottoms, would in the course of time be sufficient not only to smooth and groove the rocks, but also to scratch blocks and stones that lay in the bottom of the sea or were imprisoned in the floating ice.

Between the valley of Llyn Cwellyn (Cwm Seiont) and the lakes of Llanberis, there is a wild moorland tract almost entirely covered by Drift, till we reach the solid rocks above Llyn Padarn. Just above either side of that lake, the hills are generally craggy, or else *moutonnées*, and clear of Drift; and beyond Clegir towards Nant Francon, west of the mountains of Elidir-fach and Bron-llwyd, there is a broad moor formed by Drift of great thickness, and which, from an average height of about 1100 to 1300 feet, stretches eastward into the valley of Marchlyn-mawr, where it attains an elevation of about 2000 feet. Standing on this moor, above the left bank of the Ogwen, the eye easily detects on the opposite slopes a corresponding accumulation, stretching smoothly up the higher valleys towards Aber, and bending on the east and south-east towards the valleys of Afon Berthan, the Llafar, and Afon Gaseg; streams rising in the higher recesses of Carnedd Dafydd and Carnedd Llewelyn, on their seaward flanks. In the valleys through which the streams flow, the Drift attains an elevation of about 2300 feet, stretching into their wide recesses with a smooth outline, and I was informed * that part of these deposits contains shells at a height of about 1000 or 1200 feet.

Cwm Llafar has an interesting glacial history, and is well worth a visit, being easily reached from Bethesda. A vast semicircular hollow surrounded by the black crags (chiefly greenstone) of Carnedd Dafydd, Carnedd Llewelyn

* By the late Mr. Joshua Trimmer.

and Yr Elen forms the upper end of the valley. In the bottom of the valley, between the last-named peak and Mynydd-du, the Drift, thickly charged with angular boulders, often of large size, forms a succession of terraces, the result of marine denudation during pauses in the re-elevation of the country after its submersion to a depth of more than 2000 feet. On the south-western side of the valley there is a long and comparatively narrow channel, through which the brook runs, *bare of Drift and boulders*, and having on the Mynydd-du side a well-marked *roche moutonnée*, striated in the direction of the valley, thus marking the course of a narrow glacier about two miles in length, *that ploughed out a long straight hollow in the Drift*. That this clearance was not effected by the existing little stream is evident; for it is utterly inadequate to remove the great blocks that form the bulk of the terraced drift. The removal by running water of the lighter detritus mixed with these would, indeed, have *concentrated* the boulders on the surface of the straight alluvial hollow, in the manner they now are concentrated by river denudation on the banks of the far more powerful Gorfai, two miles S. and S.E. of Caernarvon. As the Cwm Llafar glacier decreased in size, it deposited a minor terminal moraine where the brooks meet below Nant-bach and Nant-y-craig. Within this barrier a small lake seems to have been dammed up, till the brook at the outlet cut a channel to the bottom of the moraine, and the water of the lake was drained away.

The same ploughing out of the Drift by glaciers on a much larger scale is evident in the Passes of Nant Francon * and Llanberis. In the latter case this was clearly effected as far as the lower end of Llyn Padarn, on either side of

* Long since noticed by Mr. Darwin.

which, and of Llyn Peris, the glacier, having escaped from the narrow Pass, spread itself out over the high grounds by the slate-quarries, and also flowing across Clegir, as shown by the striations marked on the map, it left the Drift untouched towards the Turbary plain that lies between Clegir and Bethesda.

Before leaving the subject of the Welsh moraines and Drift, I must again call attention to the fact that many of the lakes are partially dammed up by moraines, and some of them apparently owe their existence to these ice-formed mounds in a manner altogether peculiar.

The mouth of a valley is surrounded by a mound or series of united mounds curving outwards, formed of earth, angular, subangular, and sometimes smoothed and scratched stones, so truly moraine-like in their arrangement, that their origin and the places whence they came are unmistakeable. A deep clear lake lies inside, and the drift of the glacial sea, full of boulders, slopes right up to the outside base of the moraine, with a long smooth outline, showing that the glacier descended to the sea level, and pushing for a certain distance out to sea, formed a marine terminal moraine, while ordinary drift detritus, partly scattered by floating ice, was accumulating beyond. In the meanwhile the space on and beyond the sea level occupied by the glacier was kept clear of débris; and when the land arose, and the climate ameliorated, the hollow within the terminal moraine became replenished with the water drainage of the surrounding hills, just as in earlier times it was filled with ice formed by a drainage of snow.

Such in Caernarvonshire are the lakes of Llyn Dulyn and Mellynllyn, about two miles N. E. of Carnedd Llewelyn; of Flynnon Llugwy, between Carnedd Llewelyn and the

road from Llyn Ogwen to Capel Curig; of Cwm Elen and of Marchlynmawr and Marchlyn-bach, in the high recess between Elidir-fawr and Moel Perfedd, near the path from Llanberis to Nant Francon. Judging by the present average elevation of these lakes, when the moraines that confined them were formed, the highest parts of the mountains of Caernarvonshire could not have been more than from 1400 to 2000 feet above the sea.

In those cases where ordinary terrestrial moraines form the confining barriers of mountain lakes and tarns, it is, as already stated, not to be supposed that the depths of these moraines is always equal to the profoundest depth of the lakes. The contrary, I venture to say, is often the case, although I have had no opportunity of sounding Llyn Llydaw, Llyn Idwal, and several other deep lakes, where I believe this will be found to be true. I have already said, that it seems to me probable that such rock basins were ground out by a heavy load of ice, which in its onward progress scooped deep hollows in part of its channel; and this might easily be the case, when this grinding action lasted after the glacier had retired above the position of the present lake barriers, so that the waste of the rocky floor being long continued, by degrees the glacier wore out a depression deeper and deeper, till on its final retirement the space once occupied by ice, became filled with the water drainage of the valley. As in Wales, so also I believe that this was probably the case in the valley of the Aar, above the Kirchet. It also seems to me probable that the same process helped to form the Märjelen-see, supposing that a low ridge or shoulder of rock covered by ice separates that valley from the probably much deeper hollow through which the Aletsch glacier descends.

This most interesting lake is bounded on the west by a protruding portion of the Great Glacier of Aletsch, ending in a cliff of ice, from which fleets of small icebergs frequently break. In older times a branch from the main glacier filled the space now occupied by the lake, and passing further east united the glaciers of Aletsch and Viesch. But a change of climate lessened the size of the Alpine glaciers, the uniting stream of ice gradually melted, it shrunk upwards, and all that now remains is the projection ending in an ice-cliff, washed by the waters of the lake. Old moraines furrow the sides of the bounding hills, and the lower end of the lake is partially dammed by moraine matter, which, by approximate measurement, I found to be about twenty-five feet thick from the surface of the water to the rock on which it lies.

The ice, doubtless, touches the bottom of the lake. To ascertain its depth was a matter of special interest to me, and for this purpose I borrowed a line from Dr. Tyndall. We parted on the glacier on a fine afternoon last August, and while he started with Bennen, the guide of the Æggischhorn, to pass the night in the cavern of the Faulberg on his way to the summit of the Finster-Aar Horn, I set to work with line and plummet. I was assisted by Christian Lauener, the guide of Lauterbrunnen. For the first two observations he secured me by a rope passed round my waist, but growing bolder with practice, I dispensed with this safeguard during the remaining observations, and contented myself with a place cut in the ice in which to plant my foot. The work took about two hours, for the crevasses are so frequent and broad, that it is impossible to walk straight along the edge of the ice-cliff, and we were often obliged to make long detours to

reach the points from which I wished to take the soundings. As might be expected, the lake is shallowest near the sides, and deepest near the middle where the cliff of ice lowers, till its edge is only a few feet above the water. The greatest height of the cliff above water was sixty feet. By seven accurate soundings, I ascertained that the depth of water by the ice-cliff varies from thirty-four to ninety-seven feet.*

It may be that this inner hollow was scooped out by ice in the manner above suggested.

Next day but one I returned alone to make some further observations on the glacier between the Märjelen-see and the ridge beyond the Bettenhorn, and I was surprised to find that a large part of the ice-cliff I had walked along had broken away, and was floating about the lake in a prodigious number of white icebergs, some of them bearing stones and boulders, like the bergs in a little fiord of an Arctic Ocean. The day after, while enjoying the scene with Dr. Tyndall, one of these becoming topheavy from the more rapid melting of the ice below the water, rolled completely over with a great roaring noise of displaced waters pouring down its sides.

In still weather many boulders may be seen scattered over the bottom of the Lakes of Llanberis; and since visiting the Aletsch Glacier I have often thought, that one episode in the glacial history of the Pass may have been, that these boulders were scattered by icebergs broken from a glacier that descended into the lake of Llyn Peris, like the great cliff of ice that now overlooks the Märjelen-see.

The erosion of such hollows by ice also seems strictly

* The temperature of the water near the ice was 3° Cent., and further off it rose to 3½° at 6.30 P.M.

analogous to that which scooped out more perfect rock-basins, not only of the small lakes and pools in ordinary glacier-valleys (such as those of Cwm-glas on Snowdon,

AN EPISODE IN THE HISTORY OF THE PASS OF LLANBERIS.

and of Llyn Cywion above Nant Francon), but also of those that lie on high passes and watersheds, like the Todten-see, between the Grimsel and the Valley of the Rhone; or again, on high surfaces, like the tarns on some of the rough table-lands between Ffestiniog, Nant Gwynant, and the river Conwy. The producing cause of these peculiar hollows was probably an immense weight of superincumbent ice pressing and grinding *downwards and outwards*, over high, flat, and sometimes broad watersheds and table-lands, during that period of intense cold that produced the

glaciers of Wales, and the great original extension of the glaciers of Switzerland.

The gradual destruction of ice-worn surfaces is a point of considerable interest and importance, for, though these signs must endure for many ages to come, still they are hastening to decay. When the turf and glacier débris is lifted, the underlying surfaces of cleaved slate often still retain a perfect ice-polish, yet, after long exposure, the smoothness and finer markings disappear; and though the general rounded form perfectly remains, the surface becomes roughened, and the highly-inclined cleavage planes present on their edges a slightly serrated aspect. The deeper flutings, however, often remain for a long time; but even these at length vanish, though it is not until long after this has been effected that the general rounded form of the *roches moutonnées* is entirely obliterated.

Phenomena of the same general nature are observable in the igneous and other uncleaved rocks over which a glacier has passed. The original polished surface, on exposure, becomes roughened by atmospheric disintegration; but the general form long remains to attest its glacial origin, and in no case is there any danger of the experienced eye confounding this with those forms in gneiss produced by spherical decomposition, about which so much has been written. Finally, in the long lapse of time, air, water, and repeated frosts do their work, the rock splits at its joints, crumbles, masses fall off, and by degrees it assumes an irregular and craggy outline, altogether distinct from the glaciated surface produced by the long-continued passage of ice; and thus it happens that on the very summit of some tower-like crag, the sides of which have been rent by the frosts of untold winters, the student of glacial phe-

nomena sometimes finds yet intact the writing of the glacier; while below on its sides all trace of the ice-flood has long since disappeared. These things may seem almost incredible to those who are unaccustomed to read the records of many terrestrial revolutions in the rocks; but, nevertheless, of these extinct glaciers it is true, that just as a skilful antiquary, from the wreck of some castle or abbey of the Middle Ages, can in his mind's eye conjure up the true semblance of what it was when entire, so the geologist, from the signs before him, can truthfully restore whole systems of glaciers that once filled the valleys of North Wales.*

But these things being true, what relation in time is there between the old glaciers of Switzerland and those of Wales? The elements from which to attempt a solution of this question are few. First, it may be said that the signs of glaciation in the former extension of still existing Swiss glaciers, are not only identical in all respects with those of the extinct glaciers of Wales, but also that in many an Alpine valley there are all the ice marks remaining, even when no diminished glacier still holds its place amid its uppermost recesses. These in all respects may be compared to the ancient glaciers of the neighbouring Vosges or of Wales. Again, when we consider that the great old glaciers of the Oberland apparently opened out on the broad drift-covered territory that extends northward to the Jura, there is another point of resemblance. So similar in general structure and in all its adjuncts is this Drift with that of the north of Europe, that I see no reason whatever

* And in like manner of the Highlands of Scotland, and of Ireland, and the mountains of the Vosges. See Hogard and Dolfuss-Ausset. "Coup d'Œil sur le Terrain erratique des Voyes, 1848."

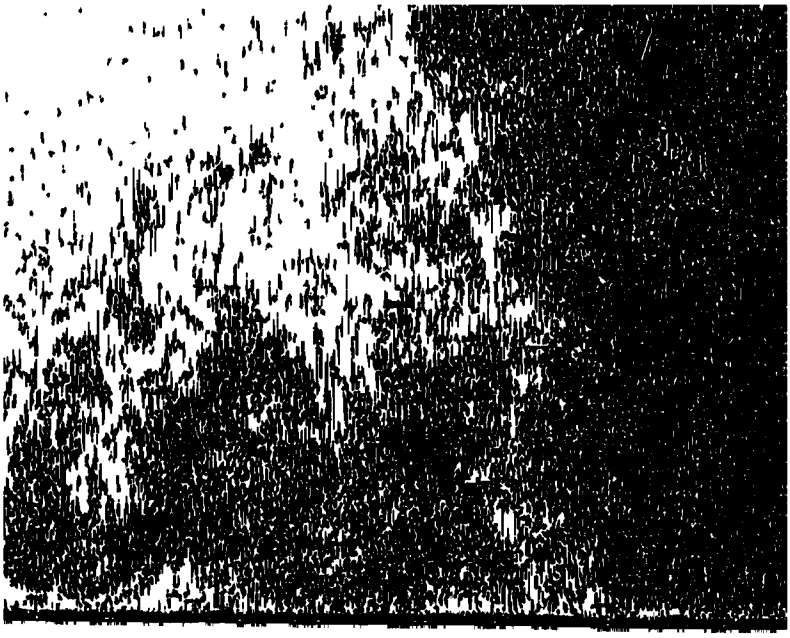
to doubt their identity. To add weight to this opinion, I have already quoted the high authority of Mr. Smith of Jordan Hill, who informed me, that he recollects seeing in the museum at Berne, a neglected collection of *Swiss shells*, arctic in their grouping, and subfossil, like those of our Newer Pliocene beds; and in the museum at Geneva a similar collection, among which was *Mya Udivalensis*. Further, it is well known that in the superficial deposits associated with these, the bones of the great hairy elephant (E. primigenius), and other mammalian remains, occur by the Lake of Geneva, at Winterthur, and in other places; and though no one that I know of has yet attempted to prove the ploughing of drift out of the mouths of Swiss valleys by the older and larger glaciers, yet in every other respect the conditions are so identical, that I am prepared to expect that this also will be proved, and I cannot resist the conclusion that, when glaciers filled the valleys of Wales it was at that very time (the Newer Pliocene epoch) that the glaciers of Switzerland attained their great original extension.

Further, in spite of the modern fact that far south of the equator the cold is greater than in equivalent northern latitudes, it is difficult not to speculate on the probable existence of a climate perhaps colder for the whole world, during what is often called the glacial period; a period when not only the Alps, but all Scandinavia, were full of great rivers of ice descending to the sea; when the White Mountains of North America also had their glaciers*, and when the great glaciers of the Himalayah, as described by Dr. Joseph Hooker, descended 5000 feet

* So I was informed in 1857, in conversation with Agassiz.

below their present levels, the older moraines being in one instance only 9000 feet above the sea, whereas the present end of the glacier lies at a height of 14,000 feet.

Another point often occurs to my mind,—what relation have these extinct glaciers to the human period? This is a subject on which we still are in the dark, but considering that in several Newer Pliocene bone-caves flint knives have been found,—there is reason to believe coeval with elephants, rhinoceroses, and other Mammalia partly extinct;—and that in France, at Abbeville and Amiens, well formed flint hatchets of an old type occur in fresh-water and marine strata of so-called *Upper Drift;* that a human skeleton was found in the Loess by the Moselle along with extinct Mammalia; and also, that a human skull was dug out of the so-called Pliocene volcanic ashes of Auvergne, it is possible, and perhaps even probable, that, long after the Drift was raised above the sea, the eyes of men may have looked upon the Welsh glaciers, when, in their latter days, the ice had shrunk far up into the highest recesses of the mountains.



ERRATA.

(*To be placed by the binder after page* 466.)

Page 408, line 12, *add* foot-note, "* Agassiz, Études sur les Glaciers, p. 253."

„ 409, *dele* foot-note.

„ 415, line 6 from foot, *for* "8000 and 9000" *read* "17,000 and 18,000."

„ 417, line 3 of note *, *after* "erosion" *insert* "at different levels. (Journ. of Geol. Soc. 1856, p. 102.)"

„ 424, line 13, *for* "Nant Gwryd" *read* "Nant-y-gwryd."

„ 429, line 8 from foot, *after* "14 by 10" *insert* "and probably weighs about 5000 tons."

„ 454, line 2, *for* "*Maen*, or the stone" *read* "*Maen-bras*, or the large stone."

„ 465, line 7, *after* "*Mya Udivalensis*" *add* foot-note, "* See also Journ. of Geol. Soc. vol. xii. p. 120."

„ 466, line 12, *after* "*Upper Drift*" *add* foot-note, "* Confirmed by Prestwich."

CHAP. XVII.

ÆTNA.

ÆTNA! What business has an ascent of Ætna in the Chronicle of the doings of the Alpine Club? Ætna is not in the Alps; nor is it 13,000 feet high, as the Catanians vainly pretend.*

Let me tell the objector that the Alpine Club, while it derives its name from one familiar group of mountains, is thoroughly Catholic in its principles, and already sees visions of a banner with a strange device floating on the summit of Popocatepetl and of Dharwalagiri, and is hoping by the influence of its enlightened members to drive out the last remnants of the worship of Mighty Mumbo Jumbo from the Mountains of the Moon. And so neither his fiery nature nor his transalpine position have been considered as sufficient reasons for excluding

* Captain Smyth in 1815 fixed the height of Ætna at 10,874 English feet by trigonometrical measurement; in 1824 Sir John Herschel, who was ignorant of this result, ascertained by means of careful barometrical calculations that its height was 10,872½ feet, but to the present day many of the Catanians, with a most praiseworthy zeal for the honour of their mountain, refuse to bate one inch of the 13,000 feet which they have been taught to assign to it by earlier measurers; though indeed, Ferrara informs us that some have supposed it to be five miles, others more. Now as a Neapolitain mile is equal to 6136·2 English feet, this would give the very respectable height of 30,681, *i. e.* nearly 3000 feet higher than the highest peak of the Himalaya, a result to which I would very respectfully call the attention of patriotic Catanians.

the glory of Sicily from companionship with the frozen giants of Central Europe.

I, the poor writer, however feel that I labour under a great disadvantage in comparison with my comrades. Most of their ground is known but to very few, and if they should occasionally give the reins to imagination, a practice which, after all, many illustrious writers have sanctioned, they are not likely to be found out, or called ugly names. But this Ætna of mine has been visited and written about by all sorts of people, even by ladies unprotected by those scarlet continuations, which one fair tourist so gracefully assumes; and thus, should I make ever so little a slip either in ascending or descending, up will go my legs, and, as De Quincy says on a somewhat different subject, I shall be "landed in a lugubrious sedentary posture, to the derision of all critics, compositors, pressmen, devils, and devillets."

Though I had never been in Sicily till the spring of 1858 the peak of Ætna was as welcome as the face of an old friend, when I saw it for the first time from the public gardens of Caltagirone. I had been wandering along the western and southern coast of Sicily, with a burning sky, and — to speak truth — had found a good deal of the country through which we passed flat and uninteresting. My thoughts and longings had often turned to the land of glaciers, but now with a distance of only fifty miles between us I saw a veritable snow besprinkled mountain, and dwelt with pleasure on the thought that in three or four days' time, if all were well, I should know something more about its summit.

I reached Catania about mid-day on the 29th of April, and could I have had my own way, should have started

that afternoon for the ascent; but my worthy guide, Giuseppe Lazarro*, who, in common with all other Sicilians fully believes that to go to the top of Ætna is a most tremendous undertaking, by no means to be treated with levity, or without the most careful preparation, insisted on my waiting till the following day. Feeling that he was much too good a fellow to quarrel with; I yielded to his arrangement, nay, I carried my submission so far as to permit him to purchase for me an effeminate apparatus of worsted gloves and stockings, without which he declared I could not possibly succeed in the attempt. I did indeed protest at first, and explained, but in vain, that I had gone up one or two hills before, and that I had never found the want of them. "Ætna," said he, solemnly, "is different from all other mountains. Many gentlemen who had been in Switzerland have talked to me as you do now before they ascended Ætna, but when they came down they said, 'Your mountain is terrible, it is far more difficult than anything in Switzerland.'" Unwilling to wound his patriotic feelings, I yielded the point, and telling him to get what he pleased, but to be particularly careful that we had enough to eat and to drink, went out for a drive through the environs of Catania. The road to Messina by the shores of the blue Mediterranean (by the bye, it is really blue, bluer even than the Rhone at Geneva) is extremely pleasant. Low hills rising close to the sea shut out the view of the volcano itself, but

* There is not a better guide for the tour of Sicily than Giuseppe Lazarro. He is not only thoroughly acquainted with the topography of the country, but is an admirable caterer, a most attentive valet, and an incomparable cook. In the actual ascent of Ætna, it is always usual to engage the guides of the vicinity, who all look up to Lazarro with unbounded respect.

you are constantly reminded of its proximity by the fantastic masses of lava, which form the only beach for some distance. This lava is very black, and were it not for the wildness of its forms would have a sombre effect. But as it is, the graceful fluid lines, and the crested waves that tell of the fiery storm which must once have raged there, are anything but disagreeable to the eye. There are, moreover, many little flowering plants, which grow even in the fissures of the lava; and wherever any accumulation of earth has taken place, there is plenty of bright green foliage.

Catania itself is built upon this same bed of lava, which extends for some miles in the direction I was now travelling, and also for nearly three miles to the south of the town, as I found, somewhat to my disappointment, on the following morning, when in search of a sandy shore, where I might bathe with comfort. Indeed, you are completely haunted by lava; walls are built of it, roads are mended with it; you sit down upon a bench, it is made of lava; you buy a pipe bowl, and it is lava too; ladies wear it in a thousand forms round their wrists, and round their necks, in their ears, and on their bosoms. I almost wonder they don't make it into something to eat; perhaps they do, for their "zuppa" is remarkably like hot water with a sprinkling of dirt in it, and this is very probably grated lava.

We left Catania on the following day, at 2.15 P.M., in full marching order, as we were to pursue our route towards Messina, after ascending Ætna.

The road to Nicolosi is a sharp ascent of twelve miles, but as Giuseppe had made up his mind that we were to have the best inn's best room, and as we knew that there

were one or two other parties on the road, we kept our mules going at a very pretty pace, and reached the resting place in two hours and a quarter, some considerable time before our pursuers.

Giuseppe was certainly right in his selection. Our inn was very preferable to the rival establishment; but our haste cost us dear in one respect, as one of the mules, who carried the greater part of the baggage, the whole kitchen apparatus, and the muleteer, sweated profusely, and then, being put into a cold stable, (of course his master never thought of rubbing him down,) was seized with a severe fit of shivering. Alas, poor beast, had he been in England, he would have had a warm mash and a good rub; as, however, he was in Sicily, he was taken to the doctor's and bled!!* Of course the next morning he was too weak for his regular work, and I had the privilege of riding him, while my own favourite, who, though the snortingest of beasts, had a peculiarly pleasant amble, was compelled to carry the pots and pans.

As soon as I reached Nicolosi, I went to pay my respects to Dr. Gemellaro, a wealthy landowner in those parts, who considers Ætna under his special patronage. He is a particularly agreeable and courteous old gentleman, and takes great pleasure in receiving strangers, and talking

* An English coachman in the service of a Neapolitan nobleman, told me an amusing incident, illustrative of the intense love for bleeding amongst Italians. He was driving a pair of young and spirited horses, who taking fright upset the carriage, and he was thrown from the box. Being, however, only slightly damaged, he had shaken himself, and was proceeding at once to assist his prostrate horses, when two worthies with solemn faces came up, and while one presented a chair, the other drew forth a lancet, and entreated to be allowed to let a little blood. If I rightly remember the conclusion of the story, the blood that flowed was not English.

with them about his own mountain, or about the discoveries of modern science, for which he has a most profound respect. His kindness, however, is not confined to mere courtesy, but he voluntarily undertakes to arrange for his visitors the whole business of guides and mules for the ascent. In fact, he kindly acts as a sort of honorary *chef des guides*, and performs the duties of the office most efficiently. I told him that although I was aware he would have others to provide for soon, I wished to be independent, and should be obliged by his securing for me a good guide, with whom I might push on in advance if I thought fit. This he promised to do, and after a long and pleasant chat, I bade him good bye, with a promise to pay him another visit on my return from the top.

From the Doctor's I went to the second inn, where I found my fellow-travellers that were to be. They were four in number, two Italian gentlemen, and a Parisian and his wife, lately married, and making, as I fancied, their wedding trip.* He was a very genial, lively fellow, and his wife a most agreeable mixture of courage and modesty, a blushing, feminine little woman, but full of enterprise, and ready for anything, though more than half afraid she ought to be ashamed of her own boldness.

We started together at eight o'clock P.M., they with three guides, and I with my one, besides which we were honoured with the company of a queer nondescript kind of gentleman, distantly connected, I believe, with the mules, who carried a lantern, and who was the only pedestrian of the party.

* They had left Palermo a day or two in advance of me, and had passed over nearly the same ground. How they managed in such wretched hovels as the so-called inns at Sciacca, Montallegro, (anything but a "cheerful mountain"), and Caltagirone, I cannot conceive.

The ascent was very gradual at first. It lay over lava, in some parts very rough, but for the most part formed into a good enough road. The pace was decidedly slow, but not so the conversation, for we chatted, and laughed, and sang right merrily. After we had been moving about an hour, the moon rose in a nearly cloudless sky, and showed us the sea girdling the plain at our feet, while we got a more accurate view of one another than we had been able to obtain by the aid of our Jack-a-Lantern. We now soon came on to some grass slopes, dotted with small scraggy oaks, and fine chestnut trees, but, unfortunately, we were too early in the season for foliage at so great an elevation.

At ten a halt was called to rest and feed the mules, and half an hour was spent, if not wasted, on this plea. The guides collected a bundle of wood, and had a roaring fire in no time. They seemed to find much solace in its warmth; but we were not at all cold, and preferred forming ourselves into a second group at some distance, where we spent the time principally in growling at the weather, which had changed in the most shameless manner, for heavy masses of cloud were rolling in upon us, and threatened rain or snow before morning.

Our spirits, however, were decidedly anti-barometrical, as I think they rather rose than the reverse; and, assuming at the bidding of the guides the worsted overalls we had brought with us, we got again into the saddle at 10.30. We had not ridden far, when we came to our first snow, all of which, by the bye, is the property of his lordship the Bishop of Catania, who is said to make a goodly income by the sale of an article, which is the universal summer luxury of the Sicilian population. It lay scattered about

in large patches, filling up the hollows of the grass slopes, and partially concealing the banks of lava which were very broken and irregular, and which gave some trouble to our beasts. Vociferation, however, and kicking will always rouse a Sicilian mule to super-brutal efforts; and the style in which my beast, who was leading, took each *mauvais pas* was highly creditable. Leaping and climbing almost with the steadiness and agility of a goat, he seemed as much at home among snow and lava, as on a high road; but, *non omnia possumus omnes*, "all mules have not the same legs," and the difficulties of sundry inferior animals in the caravan, who hesitated to follow his brilliant example, warned us about 12.45 that it was time to think of picketting the beasts, and trusting to our own exertions for the rest of the ascent.

The Doctor had very kindly presented me with a bottle of wine grown upon the mountain; and although I had originally some idea of drinking it on the summit, I felt now that, as it was highly improbable that the rest of the party would be with me there, it would be more in accordance with good fellowship to attack it at once. I announced, therefore, to the group around me the prize I had got, and the treat I intended for them, and taking from my pocket that instrument which no wise traveller is ever without, drew forth the envious cork that separated us from the promised nectar.

The bouquet was peculiar, perhaps volcanic; but I passed the cup round to each in turn, commencing of course, with my fair friend. It was received by each with solemnity befitting the occasion. There was silence. The draught was too exquisite to allow of words. My turn came to drink, and I drank.

There is a somewhat musty proverb as to the im-

propriety of examining the mouth of a gift horse, moreover it is written, *nil nisi bonum de mortuis!* Be not alarmed, dear reader; the Doctor lives, happily, and is still the source of happiness to all around him; but the bottle—the bottle lies "down among the dead men," and perhaps I ought to say no more about it; yet for the sake of science, and that wine merchants may be enabled to offer the article, as "something very curious," to their customers, who live at home at ease, I venture to suggest that the "genuine Ætna wine" may be successfully manufactured by drowning a box of lucifers in a bottle of Cape.

Dear Gemellaro, thy heart is more generous than thy wine, and for an hour's pleasant chat with thee, I would gladly submit to be drenched with a more nauseous fluid than that first draught which I imbibed on the morning of May-day, 1858.

I soon found, as I anticipated, that my pace was more rapid than that of the other travellers, but I did not expect that I should knock up my guide in the first quarter of an hour. A sound of heavy panting, however, just behind my ear, informed me that unless I intended to go up entirely by myself, I must slacken sail. We were at this time ascending the easiest possible snow slopes, very gentle rises, and the snow just crunching to the foot, so that nothing could have been better for a good burst. But when I asked my panting companion if he would like a minute's rest, he snatched at the idea with eager gratitude, but evidently had some further suggestion to make. At last, upon encouragement, he spake, and gave me to understand that the pace was not only unnecessary, but inconvenient. "The signor wishes to see the sun-rise from the summit?" "Assuredly the signor does." "But if his excellency goes

so fast, he will be there an hour and a half before the time." In short, it was clear that, if I persevered in the pace I had adopted, we should reach the top in less than two hours, and as I felt it would be absurd to select that as a waiting-place*, there was nothing for it but to lounge lazily up, and take as much time over the ascent as possible. But with a clear moonlight night, and an Alpine comrade or two, guides might be despised, and at least two hours saved in the ascent. That is to say, the travellers might safely start two hours later than the usual time, and be sure of reaching the summit half an hour before sunrise.†

Our route lay principally over beds of lava, sometimes bare, but more often covered with a thin coating of snow, and occasionally we trod on the solid rock, if such a word as solid can be applied to a volcano. At 2.30 we reached the Casa degli Inglesi, now a ruined shed filled with snow, but one of the Doctor's darling projects is to rebuild it in a much grander and more substantial form. And I cannot but hope that all visitors will increase his subscription list according to their means, for he has obtained a sadly small per-centage of the required sum.

Choosing the sheltered side of the hut, we sat down for half an hour's chat, which was certainly conducted under difficulties, my Italian being Anglo-Tuscan, and the guide's still worse, for the genuine Sicilian bears as close a resem-

* This was my feeling at the time, but I afterwards discovered that it would have really been very agreeable to have had a two hour's snooze in the warm ashes at the top.

† The only place where there could be the slightest danger in ascending without a guide, is the edge of the crater. If there were as much smoke as on the night I ascended, a stranger might reach the edge before he was aware of it; but bearing in mind that he must begin to expect it in twenty-five minutes from the Casa degli Inglesi, he could come to no mishap if he walked warily.

blance to Italian as the broadest Scotch does to the language of Cockaigne. We managed, however, to get on very well, and our good understanding was promoted by a good pull at some *vino del paese* (which, though not brilliant, was also, happily, not volcanic), till at three o'clock we started for the ascent of the final cone.

This was almost entirely covered with loose fine ashes, and as the slope was steep, it was stiffish work, and the occasional pieces of bare rock were very welcome, though after all, it was but a short affair. In about thirty-five minutes my guide threw himself down, and when I suggested that it was a pity to wait, till we had reached the summit, he informed me that we were there already. We were, in fact, within twenty yards of the edge of the crater; but the smoke was so dense that we could see nothing.

The quantity of smoke that issues from Ætna is very variable, and in still weather it ascends so vertically that the visitor finds no inconvenience from it. But unfortunately this morning there was a great deal of wind, and we had been terribly annoyed and half suffocated for some time by the dense sulphurous volumes beaten down upon us. I now lay down in the ashes, which were very warm and comfortable; and avoiding the vapour, by keeping my face quite close to the hill side, settled myself down for half an hour's doze, in the hope that the smoke might abate. As I found, on waking, there was no symptom of such a happy consummation, and no chance of our being able to see anything of the sunrise from the highest point, I determined to commence the descent, but advanced first to the edge of the crater to gain, if possible, some idea of its form. Alas! I could see only a few feet of jagged precipice immediately beneath me, and beyond, nothing but thick darkness.

It was clear Ætna was not in a good humour this morning, so turning my back upon his sulky grandeur, I was soon sliding rapidly through the ashes, and as we emerged from the smoke, I saw in the dim twilight of the early dawn the rest of the party close beneath me, on the plateau of the Casa degli Inglesi, evidently engaged in some very interesting occupation. A minute more, and I was in the midst of them; they were drinking; it was a thirsty moment.

Shortly after this the sun arose, and here ought to follow a glowing description of the scenery and of the beautiful shadow of the mountain stretching across the island; but, as is too often the case even in Italy, the horizon was so clouded that it was more than half an hour after the actual rising of the sun before we saw anything of his orb, and even then instead of shining forth as the glorious Lord of Day, he presented that ridiculous rayless appearance which we Englishmen fancy he exhibits only to our own cheerful island in the months of November and December.

Altogether it was a failure; we saw indeed the distant Calabrian coast, and caught some fine glimpses of the island itself, but there was no colour, no warmth.

Bidding my companions *bon voyage*, as they were going on to the top, and I did not feel inclined to accompany them for a second suffocation, I set off to visit the celebrated Val di Bove. I had supposed that this was an ancient crater, and my guide confirmed me in this view, but I have since discovered that geologists are of an opposite opinion, and that it is in reality a huge rent in the mountain, the result of some tremendous earthquake, coincident probably with an eruption, at a very remote period. Be this as it may, it is by far the most striking sight of Ætna. It is a vast oval arena, nearly five miles

in its longest diameter, the walls of which, almost vertical, and in parts between 2000 and 3000 feet deep, are of the deepest black, and split into the most fantastic shapes, while the floor, as it were, is covered with snow of dazzling brightness, out of which rise, here and there, monstrous obelisks of rock.

Having gazed my fill, I now commenced a rapid descent. There was nothing like a glissade, but the snow was just steep enough to get up a kind of skating movement, and by throwing out the feet quickly, a very good pace was possible. My guide seemed perfectly amazed when he saw me shooting away in this style, and leaving him far behind; but I went on my way rejoicing, and after more than once mistaking some black lumps of lava for the mules, I at last caught sight of them kicking, and devouring one another's tails, as is their wont. Jack-a-Lantern was in charge of them, and immediately on my joining him he began to reproach me for not persevering, nor do I think he was thoroughly convinced that I had reached the summit, till my panting companion arrived, and assured him that it was true, but that he had never seen such a signor before. I remarked that I was accustomed to mountains. "Credo cosi," was the exclamation of both.

I now made a hearty breakfast, washing down some tough beef and a whole pigeon (and Italian pigeons are worth eating, very different from the bits of things one gets in England) by another copious draught of *vino del paese.* With some kicking and no little bawling the mules were saddled, and a pleasant ride in the still early morning brought us to Nicolosi at 7.50, to the utter surprise of the natives, who did not expect us before mid-day.

Poor old Giuseppe looked bitterly disappointed, as he had hoped to squeeze out another day at Nicolosi. Still I

think his disgust gave way to astonishment, nay, perhaps, almost to admiration, when I told him to get things in readiness, as I should start in half an hour. "Will not the signor sleep?" "No." "Is not the signor ready for a collazione?" "He has had one already." And so before nine, spite of Giuseppe's difficulties, I had taken an affectionate farewell of the dear old doctor, and was again in the saddle *en route* for Giardini.

The whole affair occupied less than twelve hours. Practised mountaineers might walk all the way, or take mules as far as possible, and then getting general directions from their guide, and leaving him whenever they saw fit, would manage the whole distance from Nicolosi and back in nine hours, with perfect ease. They might perhaps have some difficulty in finding the best point for looking down into the Val di Bove without him, but if they feared this, they could instruct him to follow them to the Casa degli Inglesi, and wait for them on their descent; though I believe that most mountaineers would find it out for themselves, if they remembered when descending to bear away considerably to the left after leaving the shed. It is an interesting ascent even with such weather as we had, and with a clear sky it would be a glorious excursion.

J. F. HARDY.

NOTE BY THE EDITOR.

Every traveller gives, and ought to give, the result of his own experience. Mine — gained in an ascent made many years ago, early in May, 1841 — would have led me to speak more warmly than Mr. Hardy has done of the interest of the excursion and the splendour of the view from the summit, and

not so lightly as he has of the fatigue of the ascent of Ætna at that season of the year. Trusting to my legs, I took no mule, and but a light extra coat to wear at the top of the mountain over the cotton dress in which I made on foot much of the tour of Sicily. During the night a passing storm drenched us; the snow, which lay deep enough to cover all but part of the roof of the Casa degli Inglesi, was very soft for a great part of the way. Towards morning the cold became severe, and when we reached the top, an hour before sunrise, my coat, which had been strapped to a provision basket, was frozen so hard that I could not put it on. I was glad to find some snow with which to rub two fingers which had become insensible.

The great crater, a league in circumference, which was, I believe, much altered during the eruption of the following year, presented a grand and extraordinary appearance. In a few places arose columns of steam from fissures in the lava, but elsewhere snow remained unmelted, wherever a ledge or crag allowed it to rest. The glories of sunrise from Ætna have been often described. I will merely say that they soon dispelled all thought of fatigue and discomfort.

Solid boots, or else a second pair in reserve, are strongly to be recommended to those who try the experiment of walking. Mine were cut to pieces by the lava, and in that state my feet suffered much from coming in contact with the dense tufts of the spiny *Astragalus siculus*, varying in size and shape from a large hedgehog to a hunch five feet long and two high, compared to which, forcing one's way through the stoutest furze bush or quickset hedge is but child's play.

The only plants seen in flower in the upper region, above the limit of trees, were the widely spread *Draba* (*Erophila*), *verna*, *Var. inflata*, and *Viola gracilis* of Bivona, first observed on Ætna by Cupani. Bertoloni considers this to be the same as his *V. heterophylla*, in which I venture to differ from him. It is, probably, as well as a very similar plant from the Bithynian Olympus, to be counted among the varieties of *V. calcarata*.

CHAP. XVIII.

SUGGESTIONS FOR ALPINE TRAVELLERS.

It has been thought desirable to bring together in a short paper, a variety of suggestions, which are offered to those who undertake excursions in the higher regions of the Alps, with a view either to their own safety and comfort, or to the information which they may acquire and make available for others. No attempt is made to offer detailed suggestions to those who may be engaged in researches in any special branch of science. Such persons must be far more competent than the writer of this paper to determine the objects which should especially engage their attention, and the most effective means for pursuing their inquiries; but since so many of our countrymen have ceased to content themselves with following beaten tracks, and have directed their energies to the exploration of the unknown or rarely accessible portions of the European Alps and of other high mountain regions, it may be hoped that many of them will be disposed to turn to account opportunities, which few professed men of science have been able to enjoy, for contributing to the progress of our knowledge of nature. It cannot be expected that men who are fully engaged in other pursuits should, during short intervals of recreation, devote themselves to laborious observations that usually require previous knowledge and preparation, as well as cumbrous

apparatus; but when the attention of such persons is directed to particular points, where they may, with little trouble, contribute to the general store facts that may be of positive value, it seems not unreasonable to ask for their co-operation.

One proviso, however, it is desirable to mention at the outset, as it regards the point in which amateur contributors to science are too often deficient. Scrupulous and minute accuracy is the condition that can alone give scientific value to observations. A note, however short, made at the instant, or at the very earliest opportunity — the substitution of measurement, for distances and angles, in place of mere estimates, whenever this is practicable — the record of the precise date, and in some cases the hour of the day — these and other precautions, some of which are specified amongst the following suggestions, may make the whole difference between the value or the worthlessness of a traveller's contribution to the treasury of science.

Mode of Travelling in the High Alps.

This subject requires a few words of allusion to the difficulties and dangers incident to travelling in a region where, excepting steep faces of rock, the surface is covered with snow or ice. These may at once be divided into two classes,— the real and the imaginary. Where a ridge or slope of rock or ice is such that it could be traversed without difficulty if it lay but a few feet above the level of a garden, the substitution on either side of a precipice some thousands of feet in depth, or of a glacier crevasse, makes no real difference in the work to be executed, but may act intensely on the imagination of a

traveller. The only means for removing this source of danger is habit; those who cannot accustom themselves to look unmoved down vertical precipices, and, in cases of real difficulty, to fix their attention exclusively upon the ledge or jutting crag to which they must cling with foot or hand, should forego the attempt to take part in expeditions where they will not only expose themselves to danger, but may be the cause of equal danger to others.

The real dangers of the high Alps may, under ordinary circumstances, be reduced to three. First, the yielding of the snow bridges that cover glacier crevasses; second, the risk of slipping upon steep slopes of hard ice; third, the fall of ice or rocks from above.

From the first, which is also the most frequent source of danger, absolute security is obtained by a simple precaution, now generally known, yet unfortunately often neglected. The reader of this volume can scarcely fail to remark that, in the course of the expeditions here recounted, repeated accidents occurred, and that many of the best and most experienced Alpine travellers have narrowly escaped with their lives, under circumstances in which no danger whatever would have been encountered if the party had been properly tied together with rope. Sometimes that indispensable article is forgotten; more often the use of it is neglected in positions where no immediate necessity for it is apparent. A strange notion seems to prevail with some travellers, and occasionally among the guides, that the constant use of the rope is a sign of timidity and over caution. But in the upper region, where the ice is covered with snow or névé, it is absolutely the only security against a risk which the most experienced cannot detect beforehand; and so far from

causing delay, it enables a party to advance more rapidly and with less trouble when they are dispensed from the inconvenience of sounding with the alpenstock in doubtful positions. It is true that this latter precaution should not be omitted in places that are manifestly unsafe, but, at the best, it merely detects a particular danger without giving that confidence which the rope alone can afford. It may be hoped that before long the rope will be considered as essential a part of an Alpine traveller's equipment as reins are in a horse's harness. A man who should undertake to drive a cab without reins from Charing Cross to London Bridge, would scarcely be looked upon as an example for spirit, even if he sat alone; but if he were to induce a party of friends to travel in the same vehicle, he would justly be accused of wantonly risking the lives of others.

It is sometimes thought that for complete security, in case of the yielding of a snow bridge, the party tied together should be not less than three in number; in order that two may be available to draw out of a crevasse the one who may have fallen. But if the simple precaution of keeping eight or ten paces apart be observed by two travellers who are tied together, there is not the slightest risk incurred. The whole mass of snow covering a crevasse does not give way together, and a moderate amount of assistance from the rope will always enable the traveller to extricate himself. A good cragsman may go alone up and down the steepest pinnacles of rock; but, however strong may be the inducements to solitary wanderings amidst the grand scenery of the high Alps, the man who travels without a companion in the snow region can

scarcely be thought more reasonable than the supposed cab-driver alluded to in the last paragraph.

Against the risk of slipping upon steep slopes, the rope is usually a protection as effectual as it is in the first case. There may be positions in which the footing of each traveller is so precarious, that if tied together a slip on the part of any one of them would probably cause the destruction of all. Such positions are, however, very rare, if indeed they anywhere occur. There are few descents steeper than that of the ice-wall of the Strahleck, yet Desor recounts a case in which three travellers, all slipping at the same time, were upheld, and saved from falling into the *bergschrund* by a rope sustained on the arm of a single guide who came last in the descent.

For surmounting steep ice slopes the axe is the proper instrument, but there is some difference of opinion as to the most available form and dimensions to be given to it. In considerable expeditions it is well to be provided with two axes, both to save time, by enabling two to work together, and to provide for the accident of one being lost or broken. In cases where there is not much work to be done in cutting steps, a moderately heavy geological hammer, of which one side is made in the form of a short pick, is sometimes a serviceable weapon.

The general experience of Alpine travellers is not favourable to *crampons*, but many have found advantage in screws armed with a projecting double-pointed head, which are sold at the Pavillon on the Mont Anvert. Screws of the same kind, but made of better steel, and arranged in a convenient way for driving them into the soles and heels of boots, are sold in London by Lund in Fleet Street.

In the lower part of a glacier, a traveller is sometimes arrested by a short, steep bank of ice, when unprovided with any convenient means of cutting steps. In such a case, and especially when armed with steel points in the heels of his boots, he will sometimes find it easier and safer to mount backwards, propping himself with his alpenstock, and biting into the ice with his heels.

To experienced travellers, no caution as to alpenstocks is needed, but to others it may be well to say, that those commonly sold in Switzerland are never to be relied upon. There is scarcely one of them that is not liable to break, if suddenly exposed to a severe strain. A stout ash pole, well seasoned, and shod with a point of tough, hardened steel, three inches long, instead of the soft iron commonly used, will not only serve all the ordinary purposes, but help to cut steps in a steep descent where it is difficult to use the axe with effect.

The danger of ice and fragments of rock falling on travellers in high mountains, may, to a great extent, be avoided by a judicious choice of route. Experience and observation enable a traveller to recognise at once the positions in which ice is detached from a higher level, and falls abruptly over a precipice, or steep slope of rock. In certain situations this is a matter of hourly occurrence, especially in warm weather, and as the falling ice never keeps together in a single mass, but breaks into blocks of various sizes, up to three or four hundred weight, positive risk is incurred by passing in the track of their descent. The guides are usually alive to this source of danger, and very careful to avoid it, unless in case of absolute necessity; it is considerably diminished when the exposed place is passed early in the morning, before the sun has

reached the upper plateau from which the ice is detached, or late in the evening, after his rays have been withdrawn.

The least avoidable, but also the most unusual, source of danger in Alpine excursions, arises from the fall of rocks, which may strike the traveller in their descent, or else detach themselves while he is in the act of climbing over them. The first accident is more frequent during, or immediately after, bad weather, and need scarcely count among the ordinary perils of Alpine travel; the second is almost peculiar to limestone rocks, which, especially in the dolomite region of the eastern Alps, often have their outer surface broken into loose and treacherous blocks, that yield to the pressure of hand or foot. Close attention, aided by some experience, will direct the traveller to test the stability of each projecting crag, so as to avoid unnecessary risk.

Besides the ordinary risks of Alpine adventure, which, by reasonable caution, may be brought within as narrow limits as those of other active pursuits, there are the special risks that are sometimes encountered during the continuance, or immediately on the cessation, of bad weather. These are sometimes serious, and should not be made light of by those who care either for their own safety, or that of their companions. Bearings carefully taken with the compass, and attention to land-marks, will generally enable a party to retrace their steps, even when these have been effaced by falling snow, and in case of decided bad weather, there is no other rational alternative. Newly-fallen snow, lying upon the steep frozen slopes of the névé, presents a serious danger to those who attempt to traverse it. The well-known accident, by which three lives were lost, during Dr. Hamel's attempted ascent of

Mont Blanc, is one instance of the effects of the avalanches which are easily produced in this condition of the snow; and the attempt to ascend the Great Schreckhorn, recounted in this volume, was near resulting in similar fatal consequences.

A precaution strongly to be recommended before undertaking expeditions over unknown glaciers, is to make a preliminary survey from some point commanding a view of the route to be traversed, and to preserve a rough plan of the disposition of the crevasses, the direction of any projecting ridges of rock, and even of the situation of snow bridges in the crevassed parts of the glacier. A *reconnaissance* of this kind carefully executed, may save hours that would otherwise be lost in searching for a passage in difficult situations.

In the matter of clothing and diet the tastes of Alpine travellers naturally vary; but perhaps twenty years' experience of the advantages of a Scotch plaid by one who has made it an invariable companion, may entitle him to recommend it. Whether for protection in case of an unexpected bivouac, for sleeping in suspicious quarters, or on hay of doubtful dryness, for shelter against the keen wind, while perched on a peak or the ridge of a high pass, or against rain and snow, this most portable of garments is equally serviceable. For excursions where some days must be spent in châlets, and no supplies but milk and cheese can be counted on, rice is the most portable and convenient provision. One pound is more than enough for a man's daily diet when well cooked with milk, and with this he is independent of all other supplies. To some persons tea will supply the only luxury that need be desired in addition. A few raisins are a very grateful

bonne bouche during a long and steep ascent; but the best preservative against thirst is to keep in the mouth a quartz pebble, an article which the bounty of nature supplies abundantly in most parts of the Alps.

Measurement of Heights, Distances, and Angles.

There are few travellers who do not from time to time feel the desire to ascertain the heights of objects, the distance from one point to another, or the steepness of slopes. The accurate determination of these requires the careful use of instruments, and the reduction of observations, both processes involving more trouble than unscientific travellers are willing to bestow. Setting aside levelling and triangulation, the best methods of determining elevations are by means of the barometer or aneroid, and the boiling point thermometer.

Of these instruments the mercurial mountain barometer is undoubtedly the most reliable; but it is 3 ft. 4 in. long when packed in its case, an inconvenient affair for a mountain scramble, and is liable to accident.

The aneroid is now very extensively used in government surveys, and is available for altitudes up to about 8000 feet; but, whether its accuracy beyond this limit has yet been sufficiently tested, may be doubted. A useful little pamphlet, explaining the use of these two instruments, has been published by Elliot Brothers, 30, Strand.

The temperature at which water boils varies with the pressure, atmospheric or other, exerted upon it. Consequently, in an open vessel, it varies with the weight of air

resting on the water, or, in other words, with the elevation. But as this pressure varies also with the temperature and other conditions of the air, it is not possible to determine by a single boiling alone the elevation of the observer. Tables have, however, been formed, by the aid of which the difference in elevation of two stations may be determined, either by simultaneous boilings at the two stations, or by the boiling point at one, and the barometric reading at the other.*

Thermometers graduated on the glass may be safely carried in a piece of india-rubber piping in a brass tube. And very tolerable results may be obtained by boiling the water in any small tin vessel, over a candle or lamp.

A more accurate and very portable apparatus has been made†, by which the thermometer bulb is kept in pure uncompressed steam, and the tube protected from chill. When packed in a leather case with a strap to sling over the shoulder, the apparatus weighs about two-and-a-half pounds. By means of it, differences in elevation of fifty feet, or less, *e.g.* between the ground and upper floors of a house, may be determined under favourable conditions. There are, however, a variety of circumstances that materially affect the accuracy of these observations, of which one of the commonest is the occurrence of impurities in the water used.

An azimuth compass is the most convenient instrument for taking bearings. A steady and level stand may be made with the brass cover placed on the ground, and

* Such tables, as well as further explanation on the subject, are to be found in the Journal of the Royal Geographical Society for 1854, under the head "Hints to Travellers."

† The maker is Casella, of Hatton Garden.

wedged up, if necessary, with earth or stones. Many mistakes are avoided by having the compass graduated from 0° to 360°, instead of from 0° to 180° twice over. Care must, however, be taken to avoid the neighbourhood of iron. Certain rocks, especially serpentine, occasionally cause considerable disturbance. The bearings given by the compass are, moreover, only magnetic, and for determining true bearings, or for comparison with maps, require a correction for variation. A medium-sized azimuth compass, in leather case, weighs about thirteen ounces.

A pocket sextant is an invaluable companion for any one conversant with its use, and may be turned to account in a multitude of ways, which will suggest themselves to an ingenious traveller. Packed in a leather case, it weighs not more than 1lb. 1oz.

For the convenience of those who are not disposed to trouble themselves with any of the above-mentioned instruments, it may be useful to point out that approximate measures, far nearer to accuracy than the rough guesses which are generally substituted, may be made by simple means, involving none but the most elementary processes. A spirit level, which will be all the better if provided with a sight, a measuring tape, and an ivory or brass pocket ruler divided into eighths or tenths of an inch, will generally suffice; a pocket klinometer, such as are commonly sold by instrument makers, will in some cases assist in the rough determination of heights and distances, and it gives with tolerable accuracy the inclination of slopes to the horizon, the dip of strata, and other measures of the same nature. Scientific readers must excuse the roughness of processes that may be serviceable to persons who have perhaps never performed so simple a feat as to measure the height of a

tree or a church tower. It may be as well to commence with this as a simple application of the method.

1. If the sun be shining, and the ground on the side where the shadow falls be moderately level and even, measure the distance from a point immediately under the top of the tree or tower to the point where the shadow falls upon the ground; then immediately hang in a level spot in the sunshine a piece of string or ribbon stretched by a weight so as just to touch the ground, measure accurately the length of this, and that of its shadow; the height required is found at once by a rule of three sum: as the length of the shadow of the string is to that of the string, so is the length of the shadow of the observed object to its height above the extremity of the shadow. If the ground be not quite level it is easy to find the true height by the spirit level. Suppose that a person standing at the foot of the tree or tower with his eye five feet from the ground, and looking through the sight of the spirit level when this is horizontal, catches an object two feet from the ground where the shadow from the top falls, it follows that the latter station is three feet higher than the first, and that much must be added to the calculated height of the tree.

2. But it is often desirable to measure the height of an object of this description when the sun is not shining, or in cases where the shadow falls over rough and steeply sloping ground. This may be easily done with a little practice, even without so simple an instrument as the klinometer. By folding diagonally a square sheet of letter paper an angle of 45° is obtained, and keeping the side of the sheet directed to a point on a level with the eye, the position is found at which the eye, looking upwards

along the creased edge of the paper, catches the top of the object to be measured: the height above the eye is equal to the distance of the eye from a point immediately under the top of the tree or tower.

3. It is equally easy to fold paper into angles of 30° or 60°— one third or two thirds of a right angle,— and these may be used to measure objects of which it is impossible to reach the exact base.

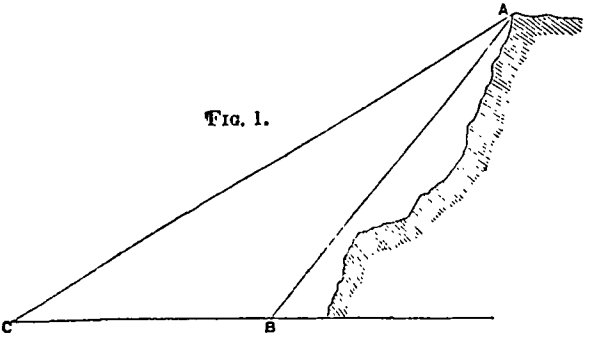


FIG. 1.

Let A be the top of a steep rock, B the point at which A is exactly 45° above the eye of the observer, C a point in the same direction at which the elevation of A is just 30°. Let the distance BC be exactly measured; the height required is given by the simple formula $H = BC \frac{1+\sqrt{3}}{2}$, or $= BC \times 1{\cdot}366$.

If the space between B and C be not tolerably level, this method will fail; but if the difference of height is not great, it will be a sufficient correction to deduct this difference from the measured distance BC, if B is higher than C, or to add it, if C is higher than B.

4. To obtain an approximate measure of the height of a

distant mountain, select an open space which commands a view of the summit. Scattered pine trees will greatly facilitate the operation. Choose a pine tree (PQ, *fig.* 2) on the side of the plain or valley farthest from the mountain (M)

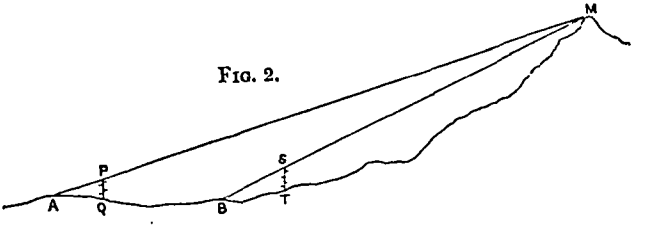


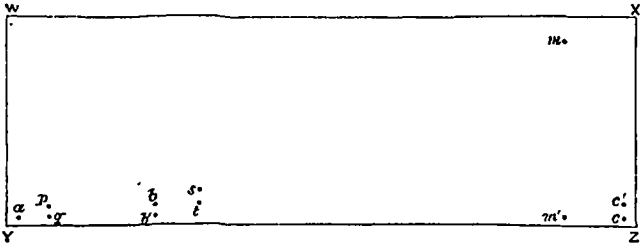
FIG. 2.

whose height is sought: measure as accurately as possible the height of PQ by any of the means already proposed, and find the point A from which the top of the pine tree PQ is exactly in a line with the top of the mountain M: mark the station A, and measure the distance AQ and note it down: if the point A is not exactly on a level with Q, the foot of the pine tree, find with the spirit-level the difference of height; and correct (by addition or subtraction) the measured height PQ, so that PQ^1 shall represent the exact height of P, the top of the tree, above the level of A, and note down the height PQ^1: standing at A, select another pine tree, ST, lying as nearly as possible in a line between the eye and the top of the mountain M, and find the point B at which the top of that tree coincides with the top of the mountain; measure the height of ST as before, and find the corrected height (ST^1) of S above B: note the distance BT and ST^1: finally, measure as carefully as possible the distance between A and B, correcting the measurement for any error arising from inequality of the ground, and note any difference of

level between the stations A and B (easily ascertained by putting together the differences of level at each length of the measuring tape), and note these down. It is now possible to determine the height of the mountain, M, without any other instruments than a few pins, a foot rule, and a large oblong deal table, such as is commonly found in a village inn.

Let WXYZ (*fig.* 3) represent such a table: plant a pin

FIG. 3.



upright at the point a close to the corner Y, and another, c, at an equal distance from the corner Z. Suppose that, on a rough estimate of the height of the mountain and the size of the table, it is determined that one inch shall represent 100 feet; then measure with the foot rule a distance aq, allowing one-tenth of an inch for each 10 feet in the distance AQ, and a fractional space for any additional distance under 10 feet, and plant a pin at q, exactly in the line ac: measure a distance qp at right angles to aq, which shall bear to PQ[1] the same proportion of 1 inch to 100 feet, and mark the point p with a pin as before. Now measure a distance ab^1, representing on the same scale the measured distance AB, and place a pin at b^1 in the line ac: if it was found that the station B was not at the same level as A, measure a distance b^1b at right angles to

$a\,b^1$. and above or below the line $a\,c$, according as B was higher or lower than A. Let the length of $b^1\,b$ be proportioned to the difference of level between the two stations, and plant a pin at b: measure $c\,c^1$ equal to $b^1 b$, and in the same direction, and plant a pin at c^1: fix in the same manner the point t in the line joining b and c^1, so that $b\,t$ shall be proportioned to B T; and fix a pin at s, so that $t\,s$ shall represent, on the scale adopted, S T′. Now find by trial the position of the point m, which shall be exactly in a line with the pins fixed at a and p, and also with those at b and s, and in the line $a\,c$ mark a point m^1, so placed that $m^1\,m$ shall be at right angles to $a\,c$. The required height of the mountain above the first station A is now found by measuring the distance $m\,m^1$ and multiplying it by 1200, or in the proportion of 1 inch to 100 feet.

In the case of a high and distant mountain there are two corrections which ought to be applied: the one, for refraction, is a deduction from the calculated height, the other, for the curvature of the earth, is in the opposite direction. Both may safely be neglected in a mode of measurement which cannot be made better than a tolerable approximation.

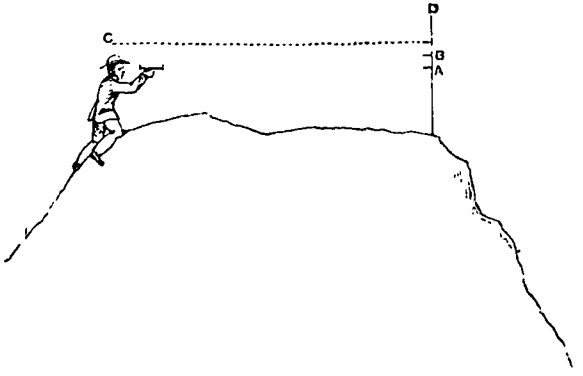
Where intermediate objects of moderate height, such as trees, buildings, or projecting rocks, are not available, as where it is sought to measure a peak from the surface of a glacier, or an exposed treeless *plâteau*, a tolerable substitute may be found by planting an alpenstock firmly in the ground, and causing an assistant to hold another steadily, and as upright as possible, upon the top of the first. These are equivalent to trees twelve or thirteen feet high in the illustration already given of the proposed method; and to compensate for the disadvantage of their

small height, there is the advantage of being able to select the most favourable position for the base A B.

Although this process is available only to give the approximate height of a peak above a station which may be arbitrarily selected by the observer, there are few valleys in the Alps where the heights of villages, &c., have not been measured from the level of the sea, and where it is not easy to connect the height of the station selected with that of one already determined and published.

5. It happens now and then, that some interest is felt in deciding upon the comparative height of neighbouring peaks, nearly of the same elevation. An instance may be given in the case of the Mischabelhörner, where the relative height of the Dom and the Täschhorn is not yet clearly determined. A traveller, provided with a spirit-level, who attains either peak may easily decide such a question as this, where the shape of the summit will allow him to place himself at a distance of twelve or fifteen feet from one of his companions placed between him and the

FIG. 4.



peak which he wishes to compare with his own position. Let C (*fig.* 4) represent the observer, D an alpenstock held

vertically between him and the peak to be observed. Let the point of a knife be carried along the edge of the alpenstock by an assistant, until it is exactly on a level with the eye; and let him make a mark at that point (A), and a similar mark at the point B, exactly in a line between the observer's eye and the top of the distant peak: the distance from his eye to the edge of the alpenstock, and the space between the two marks A and B, should then be accurately measured. Where maps exist on which the relative position of the peaks is laid down from actual survey, the distance between them may be found with sufficient accuracy from the scale of the map, and the difference of height between the peaks is found by a rule of three sum. In case, however, this distance cannot be ascertained with moderate accuracy, the bearing of the second peak should be observed with the compass, and attention given to discover at the foot of the mountain some convenient spot (bearing about 90° from the line joining the two peaks) from whence they are both visible. From such a position it will not be difficult, by some method similar to those already suggested, to estimate roughly the distance between the two peaks. When these are near together, say, not more than a mile apart, and of nearly the same height, no correction need be made, either for refraction or for the curvature of the earth.

The application of the methods here suggested to a variety of purposes, such as the measurement of distances, as well as heights, and their adaptation to local circumstances, may safely be left to the intelligence of the traveller, who will find that the habit of testing first impressions by actual measurement will greatly increase the accuracy of those impressions.

Observations connected with General Physics and with Glacier Phenomena.

These are classed together because, in truth, the latter are merely a subdivision of the former, for which Alpine travellers have peculiar facilities.

Of the more general division, the following may be suggested as coming within the means of ordinary travellers:

1. It is desirable to obtain more accurate knowledge of the extremes of temperature at great heights. To obtain this it is desirable to establish self-registering thermometers, not merely at the highest point of a lofty peak, but if possible, at a succession of stations ranging from an inhabited valley up to the summit. A complete series of observations should include thermometers buried at a known depth in the glacier, or the névé, in well-selected stations, and marked by some object to facilitate their recovery in a subsequent season. An iron bar has been suggested for this purpose, but perhaps it would answer the purpose equally well to attach a rope to the thermometer when let down into the hole prepared for it, and to fasten the rope to a wooden stake. It is no less desirable to ascertain the temperature of the air by thermometers of the same kind, fixed in situations where they could not be covered by winter snow. A few iron holdfasts might be driven into chinks of rock near to the summit of such peaks as the Rosa, the Finsteraar Horn, or the Dom, care being taken to place the instrument clear of rocks or ice that may fall from above.

2. Observations on the hygrometric condition of the at-

mosphere at considerable heights, by which the absolute amount of moisture, as well as the relative amount as compared with its temperature, should be ascertained at various periods of the day and night, are much to be desired. Their value would be much increased if made simultaneously at two or more stations very different in height. Daniell's hygrometer would give the most valuable results, but it is a somewhat troublesome instrument; failing that, observations with the wet bulb thermometer would not be devoid of interest.

3. Systematic observations on the permeability of the lower strata of the atmosphere to light and to radiant heat are much to be desired; but the subject is one of great delicacy, both in regard to the bearing of observations upon theory and the means of observation themselves. Some interest would attach to carefully-made observations upon the effect of sunlight, and of the diffused light of the sky, upon photographic paper, at great heights.

In regard to the phenomena of glaciers, the following *desiderata* may be pointed out:—

4. We are still very ignorant of the depth to which the greater glaciers extend. It may be considered certain that in the central part of such glaciers the crevasses never penetrate the entire thickness of the ice, yet further measurements of the depth of crevasses could not fail to be valuable; better still would be—

5. Measures of the depth of the *moulins* on such glaciers as the Aletsch, the Gorner, or the Mer de Glace of Chamouni. The most effectual mode of sounding would be by diverting the stream into another channel. Two or three small pine trunks laid across the shaft of a *moulin*

would enable a traveller, attached to a rope, to descend with safety to a considerable depth, and his observations on the structure of the ice in the interior of the glacier (of which he should make immediate notes) could not fail to be interesting.

6. The rate of progression of but few glaciers has been carefully observed. Further measures are to be desired, and may be executed with little difficulty. Selecting a station on the lateral moraine, or on rocks near the bank, from which an assistant on the surface of the glacier may be seen in a line with some well defined object on the opposite bank, he should be directed to hang a plumb line from the point of his alpenstock so as just to touch the surface, and to move right or left by signal until the alpenstock is exactly in the line joining the eye and the fixed point opposite. The signals should be arranged beforehand; one or the other arm extended will direct the assistant to move to the right or left, and the arm pointing upwards will show that he is at the right point. He should then, with an iron jumper bore a hole vertically at the exact point where the plummet touches the glacier, and plant a short stake in the ice. Returning, after an interval of days and hours exactly recorded, to the same station, which should be marked so that the eye can be brought back exactly to the same point as at the first observation, the same process should be repeated, but if the observations are not to be renewed it will not be necessary to bore a hole again in the ice. If the new point on the surface of the glacier (lying exactly in the direction joining the two fixed points on the opposite sides of the glacier) be merely fixed by some small object planted in the ice above the stake that had been driven in at the first visit, the dis-

tance between them will show the number of feet and inches that the glacier has advanced during the interval between the two observations. It is important that the position of the point where the motion is measured, its distance from each side of the glacier, and from the centre of the stream, should be noted as accurately as possible. It is also desirable that a record of the state of the weather, and of the temperature, at rather frequent intervals, should be preserved.

By selecting a favourable station it will often be practicable to measure at the same time, and from the same station, the motion at four or five different points upon the surface; but if that cannot conveniently be done, the observer may move from the first station on *terra firma* to the point where the first stake has been driven in, supposing that to command a view of the fixed point on the opposite side of the glacier, and taking care to keep the eye exactly over the point at which the stake has been driven into the ice, one or more new points may be fixed in the line traversing the glacier.

7. It is a matter of considerable interest to determine, by some process similar to that above described, the motion of the top and bottom of any portion of a glacier where high vertical sections are exposed.

8. The measurement of the dirt bands, first observed and correctly described by Professor Forbes, is still a *desideratum;* they are seldom if ever visible on the surface of the glacier, but are seen under favourable circumstances from points above its surface. When practicable, it would be well to send an assistant, prepared to act by signal, to measure the interval between successive dirt bands; but as this can rarely be done, it would be well to

supply the defect as far as possible by selecting a station so marked as to be recognised and found again if desirable. A rough sketch showing the form and position of the dirt bands, with reference to rocks or other fixed points in the neighbourhood of the glacier, should be made from that station. The number of bands seen within an interval that can be defined by some remarkable objects should also be recorded.

9. Further observations upon the ablation, or wasting of the surface, of glaciers, and the subsidence caused by the melting of the under surface in contact with the ground, or by internal consolidation, executed at various points, from the névé region down to their lower extremity, are still required; and it will be well to ascertain whether there is any appreciable waste of the glacier ice by melting and internal consolidation above the limit where the surface is covered with snow. Ablation may most conveniently be measured by a method similar to that adopted by M. Charles Martins in his observations on the Faulhorn Glacier. Having bored a hole some feet in depth, a stone should be placed at the bottom, and the depth from the surface to the upper side of the stone measured with a rod, or light pole, graduated to inches, which may remain planted in the hole, and kept tight by filling the spare space with broken ice. At successive visits to the glacier, it will be easy to read off the decrease in the part of the rod buried in the glacier, showing the amount of ablation during the interval between each successive visit. If it is possible to measure the displacement of a fixed point in the rod — supposed to be kept exactly vertical — relatively to a line joining two fixed points on opposite sides of the glacier, we have at once a measure of

the progression of the glacier, and of its subsidence during the same interval. The displacement, in a horizontal direction — or, more accurately, that parallel to the slope of the glacier,— shows the progression; while the vertical displacement, diminished by the portion due to the movement down an inclined plane, will measure the subsidence. *A priori* considerations would lead to the same result which is indicated by the obs vations of M. Martins,— that in warm weather the glacier ice wastes chiefly by melting from its upper surface, while the névé shrinks by internal consolidation. It is probable, however, that the ice also shrinks, though to a much smaller extent. Observations made by driving stakes horizontally into the vertical walls of crevasses may throw further light on this portion of the subject. The height of each station where the ablation is measured should be ascertained as accurately as possible, and should accompany the record of the observations.

10. Direct experiments upon the effect of great pressure upon masses of névé and glacier ice are much to be desired; but it may be feared that they will be attended with considerable practical difficulties.

Observations relating to Geology and Natural History.

As a general rule persons not possessing a competent knowledge of any particular branch of natural science cannot expect to contribute much to the existing store of knowledge by such chance observations as they may make. To this remark, however, some exceptions may be made, especially in regard to those who attain positions not previously reached by men of science. A few suggestions are here offered, not as including all that may be desired, but

rather to indicate the sort of contributions which may reasonably be expected from unscientific travellers.

1. Small specimens of the rocks composing peaks or ridges in situations not before visited or rarely accessible should be preserved. A fragment broken from a larger block is to be preferred to the small scattered pieces that generally lie in exposed places. *Each specimen should be wrapped in a piece of paper containing a note of the precise position where it was found.*

2. The moraines of a glacier furnish specimens of the rocks from various portions of the ranges surrounding it. The ticket accompanying each specimen should specify the precise origin of the moraine on which it was found.

3. A note should be made of the strike and dip of the cleavage, foliation, or stratification of the rocks in places not known to men of science, and a note should be made stating whether the rock retains its stratification, or whether it is cleaved or foliated, supposing the observer to have made himself acquainted with the indications by which these are distinguished.

4. Well characterised fossils are almost always interesting, provided that a careful note is kept of the position in which they have been found.

5. The vegetation of the High Alps is for the most part limited to species that have rather a wide range; but some interesting questions arise as to the species growing in the region where nearly the entire surface consists of snow or bare rock. Fixing the limit of this region at about 9500 English feet, specimens of all the plants found above this limit may very easily be preserved in folds of paper put into a sketch-book, or even within the leaves of a note-book. The writer of this paper would thankfully receive any such specimens, and, if so desired, would return them to their owners.

6. Persons not familiar with the Alpine flora are not likely to distinguish plants interesting by their rarity, or by any peculiarity of form, from the commoner species; but experience will enable those whose observing faculties are well developed to notice and preserve specimens of unusual species. The tickets which accompany specimens of plants, should not only give the exact *habitat*, but also the date at which they were collected.

7. Attention should be given to ascertain whether the plants found in elevated positions ripen their seeds, and specimens of these should be carefully preserved.

8. A traveller armed with a microscope would be enabled to make interesting observations on the minute forms of animal and vegetable life to be found in the snow region; but such researches require a degree of special preparation that is scarcely to be expected from ordinary travellers.

Next to the preservation of observations and specimens, attention may be called to the importance of either giving them directly to the scientific public, or of placing them in the hands of persons who can turn them to useful account. Specimens that might serve a valuable purpose in the museum of a man of science are often retained for no conceivable purpose in those inconvenient assemblages of dusty fragments that are sometimes called "collections of curiosities."

J. BALL.

NOTE.

Since the foregoing pages were in type, I have been favoured with the following valuable note by Professor Ramsay.

"It is of the highest importance to examine critically the

country between the Bernese Oberland and the range of the Jura, especially with reference to the nature of the Drift that covers it, and the organic remains that may be found therein. Marine shells may probably be found in some of the lower beds; and perhaps freshwater shells and the bones of mammals in the higher beds. If so, careful notes should be made of the positions, and the details of the strata in which these occur. It is also of the highest importance to note everything connected with the outflow of the old great glaciers of the Alps towards the lower countries that lie between the Oberland and the Jura, especially with reference to the ploughing out of the Drift, so that it may be *proved* whether or not the glaciers are of later date than this deposit. Any one also who will devote himself to one great glacier valley, like that of the Upper Aar, and *map* the striations on its sides up to the crests of the mountains, will confer an inestimable benefit to Tertiary Geology, and gain for himself a worthy name. I have for years wished to do it myself, but lack time, and am never likely to find it."

A. C. R.

APPENDIX.

Table of the Heights of the chief Mountains in the Chain of the Alps, including all above 12,000 *English feet.*

It may be stated at the outset that the existing materials do not suffice to make the following Catalogue either perfectly complete or entirely accurate. In regard to the Alps of Dauphiné, and part of those of Savoy and Piedmont, the compiler has been unable to procure some recent publications which would have helped to complete the list; and even in the districts that have been carefully surveyed by competent persons, there are ambiguities arising from the different results obtained by different observers, from the confusion of names that frequently arises in the unfrequented parts of the Alps, and from errors with which there is reason to believe that particular observations have been affected.

In the following Table the second names by which peaks are known in adjoining valleys, or by which they have been designated by particular writers, are introduced within brackets. The name of the observer, on whose authority a height is stated, is in most cases given. Where a mean between the measure-

ments of several trustworthy observers has been adopted, it has not been thought necessary to state the heights given by each of them.

To decide what peaks are to be considered as forming separate mountains, and what should be regarded as portions of the same mass, must be in a great degree arbitrary, and no absolute rule that could be proposed would be likely to be unanimously adopted. The secondary peaks which, taken together, are thought to form a single mountain, are enumerated in the second column of the Table. Those secondary peaks only are included of which trustworthy measures are available; to include others would have unnecessarily swelled the list.

An asterisk is affixed to the name of every peak known to have been ascended; so that the list may serve to show what yet remains to be accomplished by those resolute mountaineers who seem determined to efface the word "inaccessible" from the Alpine dictionary.

The note of interrogation affixed to a name implies a doubt as to its correctness or identity; but when affixed to the numbers in the column for heights, implies that the compiler feels doubtful as to the height assigned to that peak.

Name of Mountain.	Name of Secondary Peak.	Where situated.	Observer's Name.	Height in Metres.	Height in English Feet.
1. Mont Blanc	* Summit	Savoy and Piedmont	Mean	4811	15,784
	* Aiguille du Goûté	Savoy	Bravais and Martins.	4052	13,294
2. Monte Rosa	* Höchste Spitze	Piedmont and Valais	Mean	4640	15,223
	Nord End	— —	v. Welden	? 4597	15,082
	* Zumstein Spitze	— —	Mean	4569	14,990
	* Signal Kuppe	— —	—	4562	14,967
	* Parrot Spitze	Piedmont	—	4440	14,567
	* Ludwigshöhe	—	—	4337	14,229
	Schwarzhorn	—	Schlagintweit	4295	14,092
	Balmenhorn		—	4245	13,927
	* Vincent Pyramide		—	4224	13,859
3. Mischabel Hörner	Täschhorn	Valais	Berchtold	? 4558	14,954
	* Dom	—	—	? 4554	14,941
	Gasenriedhorn	—	—	4333	14.216
	(Northern Peak) Kleine Mischabelhorn.	—	—	4003	13,133
4. Weisshorn	Highest peak	—	—	4515	14,813
	Brunegghorn	—	—	3862	12,671
	Ausser Barrhorn	—	—	3633	11,919
5. Mont Cervin (Matterhorn)		Valais and Piedmont	Mean	4507	14,787
6. Dent Blanche		Valais	Berchtold	4360	14,305
7. * Grand Combin (Graffeneire).		—	Berchtold	4308	14,134

Name of Mountain.	Name of Secondary Peak.	Where situated.	Observer's Name.	Height in Metres.	Height in English Feet.
8. Strahlhorn	* Highest (Cima de Jazi, *Ziegler*)	Valais	Malten	? 4300	14,108
	? Second peak (Distelhorn, *Ziegler*)	—	Berchtold	? 4212	13,820
9. Finsteraar Horn	* Highest peak	Berne and Valais	Mean	4279	14,039
	Western peak (Agassizhorn)	— —	Stengel	3950	12,960
	Eastern peak (Studerhorn)	— —	—	3632	11,916
10. Rothhorn (Trifthorn, *Schlagintweit*).	Highest	Valais	Mean	4248	13,937
	Trifthorn	—	Malten	3651	11,978
11. Lyskamm	Highest	Piedmont and Valais	Berchtold	4247	13,934
	Pollux (Eastern Zwilling)	— —	—	? 4107	13,474
12. Aletschhorn	Highest peak	Valais	Stengel	4207	13,803
	Northern peak	—	—	3739	12,267
13. Rympfischhorn		—	Berchtold	? 4192	13,754
14. Dent d'Erron		Piedmont and Valais	—	4190	13,747
15. Jungfrau	* Highest peak	Berne and Valais	Eschmann	4167	13,671
	Silberhorn	— —	Stengel	3690	12,106
	Kranzberg	Valais	—	3718	12,198
16. * Breithorn (Trifthorn, *Ziegler*).		Piedmont and Valais	Berchtold	? 4148	13,609
17. Grandes Jorasses		Piedmont and Savoy	Forbes	4113	13,494

Name of Mountain.	Name of Secondary Peak.	Where situated.	Observer's Name.	Height in Metres.	Height in English Feet.
18. Mont Pelvoux	Pointe des Arcines	Dauphiné	?	4105	13,468
	Pic du Midi de la Grave	—	?	? 3934	12,906
19. Mönch		Berne and Valais	Stengel	4096	13,438
20. Aiguille Verte	1. Summit	Savoy	Forbes	4095	13,435
	2. Aiguille du Dru	—	—	3816	12,520
21. Gabelhorn (Moming)	Highest peak	Valais	Mean	4093	13,429
	Second peak	—	Berchtold	4084	13,399
22. Schreckhorn	Greater Schreckhorn	Berne	Eschmann	4082·5	13,394
	* Lesser Schreckhorn	—	—	4014	13,169
23. * Alleleinhorn		Valais	Berchtold	4060	13,320
24. Bernina	* Highest (Mortiratsch)	Grisons and Lombardy	Denzler	4053	13,297
	Piz Zupo (S. East peak)	— —	—	3999	13,120
	Cresta Aguiza (middle peak)	— —	—	3872	12,702
25. Walcherhörner (Viescherhörner, Ziegler)	Highest	Valais	Eschmann	4047	13,278
	Grünhorn	—	—	3869	12,692
26. Mont Iséran		Savoy	Corabœuf	4045	13,271
27. *Weissmies (Laquinhorn, *Ziegler*)		Valais and Piedmont	Berchtold	? 4038	13,249
		— —	—	4025	13,206
28. Fletschhorn	* Southern peak (Laquinhorn, *Studer*)	— —	—	3917	12,850
	* Northern peak	— —			

Name of Mountain.	Name of Secondary Peak.	Where situated.	Observer's Name.	Height in Metres.	Height in English Feet.
29. Aiguille du Géant . .	. . . . .	Savoy and Piedmont	Forbes . .	3993	13,101
30. Mont Mallet . .	. . . . .	— —	— . .	3983	13,068
31. Gletscherhorn (Range S. W. of Jungfrau .	Highest	Berne and Valais	Stengel . .	3982	13,064
	Ebnefluh	— —	— . .	3964	13,005
	Mittaghorn	— —	— . .	3887	12,761
	Ahnengrat	Valais . . .	— . .	3681	12,076
32. Eiger	. . . . .	Berne . . .	Eschmann .	3976	13,044
33. Nesthorn . . .	*Bietsch-horn or Baltschiederhorn . . .	Valais . . .	Stengel . .	3952	12,966
	Breithorn	— . . .	— . .	3795	12,451
34. Orteles.	Highest (Monte Cristallo?)	Tyrol and Lombardy	Austrian Survey	? 3950	12,960
	*Qrteler Spitze . .	Tyrol . . .	Mean . .	3911·3	12,833
	Zebru (Königs Spitze) .	Tyrol and Lombardy	Austrian Survey	3869	12,692
35. *Gross Glockner . .	. . . . .	Carinthia and Tyrol	Mean . .	3949	12,956
36. Piz Rosegg (Monte Rosso di Scersen) . .	. . . . .	Grisons and Lombardy	Denzler .	3943	12,936
37. Trugberg	Northern point . . .	Valais . . .	Stengel . .	3933	12,903
	Middle point . . .	— . . .	— . .	3660	12,008
	*Southern point . . .	— . . .	— . .	3513	11,526
38. Piz Palu . . .	Highest peak . . .	Grisons and Lombardy	Denzler .	3912	12,835
	Eastern peak (Piz Cambrena)	Grisons . . .	— . .	3607	11,835
39. *Aiguille du Midi .	. . . . .	Savoy . . .	Forbes . .	3908	12,822

Name of Mountain.	Name of Secondary Peak.	Where situated.	Observer's Name.	Height in Metres.	Height in English Feet.
40. Vieschерhörner	Highest peak	Valais	Stengel	3905	12,812
	Wannehorn	—	—	3717	12,195
41. *Petit Mont Cervin		Piedmont and Valais	Berchtold	3892	12,769
42. Aiguille de Vanoise		Savoy	?	? 3861	12,677
43. Schienhorn	Northern peak	Valais	Dufour's Map	3852	12,638
	Southern peak (Gr. Nesthorn, *Dufour*)	—	—	3820	12,533
44. *Cima de Jazi		Piedmont and Valais	(Estimate)	? 3850	12,632
45. Mont Collon (? Pointe du Glacier, *Ziegler*).		—	Berchtold	3848	12,636
46. Pic d'Otemma ? *		Valais	—	3847	12,623
47. Monte Viso		Piedmont and Dauphiné	Corabœuf	3836	12,586
48. *Vélan		Valais and Piedmont	Berchtold	3792	12,441
49. Balferinhorn		Valais	Berchtold	3780	12,402
50. Wetterhörner	*Southern (Rosenhorn)	Berne	?	?	
	*Central (Mittelhorn)	—	?	?	
	*Northern (Wetterhorn)	—	Eschmann	3707	12,162
51. Breithorn		Berne and Valais	Stengel	3774	12,382
52. *Wildspitz		Tyrol	Austrian Survey	3768	12,362

Name of Mountain.	Name of Secondary Peak.	Where situated.	Observer's Name.	Height in Metres.	Height in English Feet.
53. Grosshorn		Berne and Valais	Stengel	3762	12,343
54. Aiguille de la Sassière		Piedmont	Corabœuf	3762	12,343
55. Piz Tschierva (Piz Mortiratsch, *Dufour*)		Grisons	Denzler	3745	12,316
56. Liapey	Highest	Valais	Berchtold	3731	12,241
	Second	—	—	3559	11,677
57. Mont Pleureur		Valais		3706	12,158
58. La Levanna		Piedmont	?	3700	12,138
59. Balmhorn		Berne and Valais		3688	12,099
60. Monte delle Disgrazie		Lombardy		3676	12,060
61. *Gross Venediger		Tyrol and Salzburg	Austrian Survey	3675	12,056
62. *Combin de Corbassière Grand Combin of Bagnes (? Petit Combin, *Ziegler*)		Valais	Berchtold	3670	12,041
63. Blumlis Alp (Frau)	Highest	Berne	Stengel	3670	12,041
	Middle Peak	—	Eschmann	3661	12,011
64. La Blava		Valais	Berchtold	3670	12,041
*Tödi		Glarus	Eschmann	3622	11,883
Adamello		Italian Tyrol and Lombardy	(Engineer's estimate.)	3590	11,778
*Marmolata		Italian Tyrol	Austrian Survey (too high)	? 3581	11,749
Peak South of Cogne (? Grand Paradis ? Grivola)		Piedmont	?	? 3578	11,739
Antelao		Venetian Alps	—	3255	10,680
*Terglou		Carniola	—	2858	9,377

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